THE CRAMBIDÆ OF NORTH AMERICA.

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MASSACHUSETTS AGRICULTURAL COLLEGE,

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The insects included in the family *Crambidæ* are, so far as known, injurious to the grasses (*Gramineæ*), some living in tubular habitations which they construct near the roots, others boring into the stems of the plants on which they feed, while a few occasionally feed on plants of other families.

Distribution.

The species of this family are distributed very widely over the globe, but apparently are most numerous in the temperate zones. They are well represented in Europe and North America, and even Australia and New Zealand have a comparatively large number of species.

Injuries.

These insects feed at the roots of the grasses, and are therefore often overlooked, except where they are so abundant as to seriously injure the crops. They undoubtedly destroy a large amount of grass without being discovered, the injury being attributed to some other cause. Prof. F. M. Webster, entomologist to the Ohio Agricultural Experiment Station, wrote me, Dec. 12, 1895, that the larvæ of some species of *Crambus*, probably *trisectus* and *laqueatellus*, during May of that year were the most abundant and destructive that he had ever known them to be in the West; hundreds of acres of both corn and oats, which had been planted on spring-ploughed meadow or pasture lands, were as completely swept out of existence as if burned over, and the damage done by these insects would probably amount to several hundred thousand dollars. Professor Webster also

wrote that, a few years ago, the larvæ of *Crambus vulgivagellus* ravaged the corn fields of Ashtabula County, Ohio.

In 1881, the larvæ of *Crambus vulgivagellus* devastated the fields of several counties in northern New York, and were very abundant in many other places during that year. In 1892, the larvæ of *Crambus caliginosellus* were reported as doing great damage to corn in Delaware and Maryland, and it is a common thing to receive these moths from the farmers in various parts of the country, stating that they are more or less abundant.

Natural Enemies.

Professor Lintner bred a Hymenopterous and a Dipterous parasite from these insects, and also found the predaceous beetle, *Calosoma calidum* (Fab.), destroying them, as he believed. Professor Riley also bred two different Hymenopterous parasites from the larvæ of *C. laqueatellus*. Insectivorous birds are known to feed freely upon these moths. Professor Webster states, on the authority of J. N. Latta of Haw Patch, Ind., that the moths of *Crambus laqueatellus* were destroyed in great numbers by the wood pewee (*Contopus virens*), and I have myself observed barn swallows feeding on different species of *Crambus* in abundance in Maine. When walking through the grass, at my home on Mt. Desert, the *Crambids* were "flushed," and several swallows invariably attended us, snapping up the moths as they flew. Whenever we stopped the swallows would leave; and as soon as we started, they would return to catch the moths, often flying within a few feet of us. These observations were made during several years, and led me to conclude that farmers would do well to afford every possible encouragement to these birds to nest in their barns, for they do a vast amount of good in destroying injurious insects while on the wing.

History.

The species of this family were placed by Linnæus, in all his writings, under his genus *Tinea*. The authors of the "Systematisches Verzeichniss der Schmetterlinge der Wienergegend," published in 1776, placed them under the *Tineæ*,

in the division of *Tineæ Directipalpes*. Hübner, in his "Sammlung europäischer Schmetterlinge," figures the European species under the genus *Tinea*. A part of the plates on which these species are represented were published in 1796. Fabricius, in the supplement to his "Entomologia Systematica," p. 464, published Feb. 10, 1798, established the genus *Crambus* with sixty-two species under it, some of which do not belong to this genus and they have since been removed to other genera. Fabricius did not mention any species as the type of the genus. In Vol. III., part II., of this work, published in 1794, on p. 238, he described the species *saccharalis;* and, so far as I can learn, this was the first species of the family published from this country. Latreille, in his "Histoire Naturelle des Crustaces et Insects," Vol. XIV., p. 247, 1805, adopts the generic name *Crambus*, and places under it *carnella* L., *pinellus* L., *culmellus* L. and *pascuellus* L. The last three are still retained in the genus *Crambus*.

In 1811, Haworth published part III. of his "Lepidoptera Britannica," in which he established the genus *Palparia* for the species usually placed under *Crambus*. He had previously, in part II. of the same work, used the genus *Crambus*, but, strange to say, he had none of the species now regarded as *Crambids* under it. Leach, in the article "Entomology" in the "New Edinburgh Encyclopædia," published in 1815, adopted the generic name *Crambus*, with *pineti*, *pascuorum* and *pratorum* under it, and placed it as the second genus in his family *Tineida*. In 1817, Zincken, in Germar's "Magazin der Entomologie," Vol. II., published his monograph of the genus *Chilo*, with *phragmitellus* Hüb. as the first species under it, and this has been taken as the type of *Chilo*. Zincken included in his genus most of the species now retained under *Crambus*. In Vol. III., p. 114, 1818, Zincken described *C. leachellus*, the habitat of which was unknown, but it has since proved to be a well-known North American species; and in Vol. IV., p. 247, 1821, *C. sordidellus*, *satrapellus*, *præfectellus*, *decorellus*, *plejadellus*, *teterrellus* and *incertellus* from South Carolina, and *C. haytiellus* from the Island of San Domingo, but I have received this last species both from San Domingo and

Texas. Hübner, in his "Verzeichniss bekannter Schmetterlinge," did not adopt the generic name *Crambus*, but placed the species of the *Crambidæ* under several genera, as follows: *Argyroteuchia*, with ten species; *Eucarphia*, with *radiellus*, *fulgidellus* and *vinetella* under it. (The first two belong to the genus *Crambus*, but the last belongs to the *Phycitinæ*, and has been left as the type of *Eucarphia*.) *Catoptria*, with six species; *Agriphila*, with five species; *Pediasia*, with seven species; *Topeutis*, with ten species; *Eromene*, with one species, *bella*; *Chrysoteuchia*, with two species; *Thisanotia*, with three species; and *Exoria*, with three species. This part of Hübner's "Verzeichniss" was published not earlier than 1822. In 1825, Curtis, in his "British Entomology," Vol. III., p. 109, adopted *pascuellus* L. as the type of the genus *Crambus*. I am not aware that any one, previous to this time, specified any one of the species as the type, and therefore, in accordance with the rules of zoölogical nomenclature, this species may be regarded as such.

Stephens, in his "Illustrations of British Entomology, Haustellata," Vol. IV., p. 317, 1834, adopted the generic name *Crambus*, with thirty-eight species, but placed it in his family Tineidæ. In 1836, Duponchel published the tenth volume of "Histoire Naturelle des Lepidopteres," in which he adopted the genus *Chilo*, with *phragmitellus* under it, and *Crambus*, with many species that properly belong there, and some others that have since been placed elsewhere. In 1840, Zetterstedt, in his "Insecta Lapponica," adopted the genus *Chilo* for the species now usually placed in the *Crambidæ*, and placed it in his family *Tineariæ*, thus following the plan of Zincken.

In Vol. IX., part II., of "Die Schmetterlinge von Europa," published in 1832, Treitschke adopted the genus *Chilo*, and placed *gigantellus* Fab., with forty-three other species, under it. In 1849, Herrich-Schäffer published the fourth volume of his "Schmetterlinge von Europa," in which he established the group *Crambides*, in which he placed all the *Pyralids*, including the genera *Chilo*, *Crambus* and *Ancylolomia*.

In 1858, Christoph, in the "Stett. Ent. Zeit.," Vol. XIX., p. 313, described two species of *Crambus* from Labrador.

In 1860, Clemens described twelve species under the genus *Crambus*, in the "Proceedings of the Academy of Natural Sciences of Philadelphia," one of which, *auratellus*, belongs in the genus *Argyria*. In the same paper he published three species and placed them under the genus *Chilo*, but they did not belong there, and have been more correctly placed under the genus *Schœnobius*, which is not now regarded as belonging to the *Crambidæ*. In 1863, Walker, in his "Cat. Lep. Het.," part XXXVII., adopted the family name *Crambidæ*, with *Chilo*, *Crambus* and several other genera under it. Several North American species were described for the first time in this work, and some others were re-described. In a few cases the descriptions were made from very poor specimens, and it is not only impossible to determine the insects from his description, but very difficult to decide what they are from the types. In 1863, Zeller published a valuable work entitled "Chilonidarum et Crambidarum genera et species," in which he dealt with all the described species, and published many new ones from North America, as well as elsewhere. This work, although appearing in the same year as Walker's, was not published till July, while Walker's catalogue was published in April.

In 1866, Packard described two species of *Crambus* from Labrador, in the "Proceedings of the Boston Society of Natural History." Grote published several species, with a list, in the "Canadian Entomologist," in 1880; and Hulst described several species in the "Transactions of the American Entomological Society," in 1886.

In 1894, Felt published a paper "On Certain Grass-eating Insects," which deserves more than a passing notice. In this paper, for the first time, a special study was made of the early stages of a large number of our species, including their habitations, etc. There is still much to be done in this direction, and it is sincerely to be hoped that the work, so well begun by Mr. Felt, may be continued till we have a complete history of all our species of this family. I should mention, in this connection, the work done by Forbes on the early stages of *zeellus*, by Howard on *saccharalis*, by Miss Murtfeldt on *teterrellus* and by Scudder on *hortuellus*.

External Anatomy.

The following studies were made on *Crambus laqueatellus* with occasional references to the other species. The head (Plate A, figs. 1 and 2) is of moderate size, and connected with the thorax by a small neck. The compound eyes (Plate A, figs. 1–4, *e*) are large and hemispherical, varying somewhat in outline in the different species. The ocelli (Plate A, figs. 1–3, *o*), situated behind and near the base of the antennæ, are present in most of these insects. The antennæ (Plate B, figs. 15–17) have from fifty to fifty-five segments in *C. laqueatellus*, the basal segment being much larger than the others; the first two are covered with scales and the others with two scale clusters each, on the upper side, while fine hairs are scattered over the remaining surface (Plate A, fig. 9, and Plate B, figs. 15–17). All except a few of the basal joints have several sense pits on each side (generally four in the male and three in the female). These sense pits are circular in outline, guarded by a row of hairs which arise obliquely from the edge, and are located somewhat irregularly on the joints. Under a high magnifying power the antennal segments appear to have a reticulated surface (Plate A, fig. 10).

The epicranium is separated from the clypeus by a well-marked transverse suture just in front of the base of the antennæ. The clypeus is large and convex (Plate A, fig. 3); in some species it is more or less swollen in the middle, while in others it is produced in the form of a cone. The cheeks occupy the lower and lateral portions of the face. The small, somewhat triangular labrum is in front of the clypeus and over the base of the tongue. The mandibles are rudimentary, and armed with bristles which extend inward and rest on the base of the tongue. The maxillæ are developed into a sucking tube, which is called the proboscis or tongue. This organ varies in length, to some extent, in the different species, and is covered with scales at the basal part. When not in use it is coiled up, like a watch-spring, between the labial palpi, and concealed by them. The labial palpi have three segments, extended horizontally forward and thickly covered with scales. They vary greatly in length in the different species (Plate A, figs. 1, 2 and 3;

Plate C, figs. 1, 4, 10, 12 and 16). The maxillary palpi have three segments extending forward nearly horizontally and resting on the base of the labial palpi. They are densely scaled, and at the outer end the scales form a triangle.

Curtis figures the structural characters of what he calls *Tinea paleella* Hüb. on Plate 109 of his "British Entomology," together with *Crambus radiellus* Hüb., and represents the maxillary palpus of *paleella* with four segments arising from the side of the tongue. Felt, in his excellent work on *Crambus*, gives a figure of the maxillary palpus of *C. agitatellus*, with four joints.

The above studies were made on dry specimens, and a fourth segment could not be found. Whether it is visible in fresh specimens, I am not able to say. The maxillary palpi in dry specimens of *C. laqueatellus* certainly do not arise from the side of the base of the tongue, unless, in drying, the tissues about the mouth-parts have so shrunken as to draw them far out on the sides, as shown on Plate A, fig. 3. Mr. Felt does not indicate the origin of the maxillary palpi in his work.

The prothorax is very small, and the upper side is divided into two parts. Scudder has given the name of prothoracic lobes to similar structures in the butterflies. The mesoscuta are large, and extend far back on each side of the large mesoscutellum. The metascuta are much smaller than the mesoscuta, and are followed behind by the metascutellum. On the forward edge of the metascutum there is an area (Plate A, figs. 1 and 2) without scales or hairs, but covered with minute spines directed forward. This corresponds to a similar spiny area on the under side of the fore wing. The abdomen consists of eight segments. The genitalia of the male are often retracted to such an extent that they are not visible beyond the end of the eighth segment. No figures of these organs are given here, as Mr. Felt has already given most excellent figures of the genitalia of twenty-six different species of *Crambus*.

The legs (Plate A, figs. 5, 7 and 8) are of medium length and size, and consist of the coxa, which is comparatively long and stout; the trochanter, which is of medium size; the femur, which is of medium size and length, the middle

femur being the longest; the tibia, which is rather slim; and the tarsus, consisting of five segments, the last of which terminates in a pair of claws. There is a tibial epiphysis near the end of the fore tibia (Plate A, figs. 5 and 6), which is armed with bristles on the inner side. The tibia of the middle leg has a pair of spurs at the end, the outer of which is about two-thirds as long as the inner, and the hind tibia has a pair at the end and a similar pair at the outer third.

The fore wings are long and narrow in most of the species, while the hind wings are broad. I have adopted in this work the old system of numbering the veins, at the risk of being considered behind the times, for the reason that, notwithstanding we have recently been given several systems or modifications of nomenclature by authors in whom I have great confidence, I must confess that as yet I am undecided which one should be taken. The old system of venation of Herrich-Schäffer is shown in the wings of *Crambus pascuellus* (Plate B, figs. 1 and 2). The cell in the fore wings is closed, but in the hind wings it is closed in some species and open in others. The frenulum of the hind wing is single in both sexes, though there is an indication at the base that it is composed of several bristles fused together (Plate B, fig. 13, male, fig. 14, female).

The veins terminate at the margins of the wings in a rather indefinite way, but at a short distance from the end there are two circular spots on each vein, with short irregular lines radiating from them (Plate A, fig. 11). There is a row of peculiar spines around the outer margin, which are placed at equal distances from each other and arise very near the edge of the wing (Plate A, fig. 11, *s*). Near the base of the hind margin of the fore wing, on the under side, is a small, oval, spiny area (Plate B, fig. 11). There are no scales on this area, but it is covered with short, sharp spines, which point toward the outer end of the wing. A portion of this area, with a few of the adjacent scales, is shown on Plate B, fig. 12. This area is so placed that when the wings are closed it rests upon the similar area on the side of the metascutum, already mentioned, and the spines on the two areas then point in opposite directions. My assistant, Mr. R. A. Cooley, a most careful and pains-

taking student of entomology, first discovered these spiny areas on the wings of the gypsy moth, and has since found them in a large number of our moths and also on the *Trichoptera*. In the butterflies, however, Mr. Cooley finds the scales modified in this place to such an extent that they are intermediate between spines and scales; but in the *Pterophoridæ* there are no spiny areas. So far as he has carried his studies, it would seem that they are present in those insects which close the wings in such a manner that the under side of the basal part of the hind margin of the fore wing rests on the side of the thorax; but in those insects which do not hold the wings in this manner they do not occur, or, if present, are in a modified form. Mr. Cooley will soon publish the result of his studies.

After Mr. Cooley had found the spiny area in the fore wing of the gypsy moth, I learned that Donitz had previously discovered a similar area in the fore wing of *Dionychopus niveus* Men. of Siberia; but he claims to have found its counterpart on the hind wing, and considers it a musical apparatus. I do not know how *Dionychopus* holds its wings when at rest, and cannot express any opinion as to the accuracy of the observations and conclusions of Donitz; but I am inclined to think that the insects observed by Mr. Cooley use this apparatus for an entirely different purpose.

Family CRAMBIDÆ.

The moths included in this family are medium or rather small in size, generally of light colors. Brown, yellow and white prevail, and many of them have metallic markings on the fore wings, which are comparatively long, and in some cases narrow. These are rolled around the body when the insect is at rest, and conceal the large hind wings, which are folded beneath.

The ocelli are present in most of the species. The labial palpi are porrect, nearly straight and often long, sometimes as long as the head and thorax; the maxillary palpi are well developed and strongly triangular. The fore wings have veins 4 and 5 arising near each other, or sometimes from a stalk; 8 and 9 stalked or sometimes fused, forming a single

vein; 7 sometimes arises from the stalk of 8 and 9; 11 from beyond the middle of the cell. Hind wings, on the upper side, with a row of long hairs on the hind margin of the basal part of the cell; veins 4 and 5 stalked, or united throughout as one vein; 7 arises from 6, near its origin, anastomosing with 8.

These insects usually fly near sunset, but may be "flushed" at any time during the day. The eggs are more or less melon-shaped, ribbed and reticulated, or smooth. Larva smooth, with few hairs, feeding in silk-lined galleries on the grass family, or boring in stems. Pupa formed in a cocoon within the galleries.

Synopsis of the Genera.

1. Outer margin of fore wing with one indentation, . . . 2.
 Outer margin of fore wing without indentations, . . . 4.
2. Hind wings with eight veins, ... *Eugrotea.*
 Hind wings with seven veins, ... 3.
3. Fore wings more than three times as long as wide, *Pseudoschœnobius.*
 Fore wings less than three times as long as wide, . *Prionapteryx.*
4. Hind wings with seven veins, ... *Uinta.*
 Hind wings with eight veins, ... 5.
5. Fore wings with veins 7, 8 and 9 arising from one stalk, . 6.
 Fore wings with vein 7 separate from the stalk of 8 and 9, . 7.
6. Antennæ of the male pectinate, ... *Thaumatopsis.*
 Antennæ of the male not pectinate, ... *Crambus.*
7. Ocelli present, ... 8.
 Ocelli absent, ... *Diatræa.*
8. Fore wings three times as long as wide, . . *Euchromius.*
 Fore wings not more than twice as long as wide, . . . 9.
9. Fore wings white, with yellow markings, . . . *Argyria.*
 Fore wings yellow or brown, ... *Chilo.*

UINTA Hulst.

Head medium; front smooth and vertical; eyes large and hemispherical; ocelli present; antennæ coarsely ciliated, and toothed near the base; labial palpi porrect, about three times as long as the head, and coarsely scaled; maxillary palpi about as long as the head, quite bushy and triangular; tongue rudi-

mentary, scaled at the base. Fore wings with ten veins; 4 and 5 coalesce so as to appear as one; 7 arises from the stem of 8 and 9; 10 and 11 coalesce, forming one vein. Hind wings with a distinct pecten of hairs on the basal part of the median vein on the upper side; seven veins; 4 and 5 coalesce, forming but one vein.

This genus was established by Rev. Geo. D. Hulst in "Entomologica Americana," Vol. IV., p. 116, 1888.

UINTA OREADELLA Hulst. (Plate VI., fig. 14.)

Expanse of wings, 15 mm. (about three-fifths of an inch). Head and palpi very dark gray; thorax blackish gray. Fore wings dark fuscous, darker at the base; basal line wanting; outer line broad, dark brown; terminal line also dark brown, and a dark-brown dot occurs near the middle of the wing. Hind wings fuscous.

Only a single example of this species is at present known, and that is in the collection of the Rev. G. D. Hulst, who received it from Colorado, and published the description of it in "Entomologica Americana," Vol. IV., p. 116, 1888. I am under obligations to Mr. Hulst for the loan of this and other insects from which to make the drawings that appear in this work. Nothing is known of the early stages and habits of this rare insect.

PRIONAPTERYX STEPHENS.

Head medium, face slightly cone-shaped; eyes large, nearly hemispherical; ocelli absent; antennæ serrate in the male, simple in the female, nearly two-thirds as long as the costa; labial palpi porrect, about twice as long as the head and coarsely scaled at the end; maxillary palpi triangular, half as long as the labial palpi, and resting on them; tongue well developed; thorax and abdomen smooth. Fore wings with twelve veins, 6 and 7 from one point or stalked, 11 and 12 approach very near or join near the middle of 11, after which they run separately to the costa; outer margin notched near the end of vein 5. This genus was established by Stephens for a mutilated example of an insect which he described under the name of *nebulifera*, and of which he says: "Of this sin-

gularly remarkable insect I have seen only my own specimen, which I obtained from the collection of Mr. Haworth, who appears to have procured it from that of Mr. Francillon; I know not its locality." The type is in the Stephens collection in the British Museum, and shows very plainly the mutilation in the costa of the fore wings, which he describes as "three or four deep serratures towards the apex." It is our well-known North American species by that name, and the type was undoubtedly from this country.

Prionapteryx nebulifera. (Plate VI., fig. 1.)

Prionapteryx nebulifera Steph., Ill. Br. Ent. Haust., Vol. IV., p. 317 (1834).

Prionapteryx nebulifera Wood, Ind. Ent., p. 214, Plate XLVII., fig. 1484 (1854).

Prionopteryx nebulifera Zell., Chil. et Cram., p. 18 (1863).

Expanse of wings, 22–31 mm. Palpi, head and thorax ashy brown. Fore wings brown, with a short oblique white streak on the middle of the costa and two broader spots before the apex; an irregular quadrate white spot before the middle of the wing, extending from the hind margin across the cell; two parallel white stripes within the outer margin, within which is a large white spot with several dashes of brown upon it. Fringes cream-white, marked with two or three streaks of brown below the apex. Hind wings pale fuscous, whitish at base.

Habitat. — Texas. Early stages and food plant unknown.

Prionapteryx achatina. (Plate VI., figs. 2 and 3.)

Prionopteryx achatina Zell., Chil. et Cram., p. 13 (1863).

Crambus delectalis Hulst, Tr. Am. Ent. Soc., Vol. XIII., p. 165 (1886).

Expanse of wings, 22–25 mm. Palpi, head and thorax sordid white, dusted over with cinnamon-brown scales. Fore wings white, dusted over with cinnamon-brown scales, except on the two cross-lines; the inner one near the middle of the wing with two outward angles, the outer one somewhat arcuate. The brown scales are more numerous within

and on the outside of the outer line; those on the hind part are very much darker brown, forming an ill-defined dark spot, a similar spot between this and the base of the wing. The terminal portion of the wing white, with two dark-brown horizontal dashes and more or less light brown above the middle. Hind wings pale fuscous, paler basally.

Habitat. — Texas, Arizona. Early stages and food plant unknown.

I have carefully examined the types of Zeller and Hulst.

Prionapteryx cuneolalis. (Plate VI., fig. 4.)

Crambus cuneolalis Hulst, Tr. Am. Ent. Soc., Vol XIII., p. 166 (1886).

Expanse of wings, 19–22 mm. Palpi, head and thorax sordid white, dusted over with cinnamon-brown scales, darkest on the palpi. Fore wings white, dusted over with brown scales, but leaving cross-lines; the inner one, near the middle of the wing, edged outwardly with brown, has two angles; the outer one, angulate beyond the cell, and edged with brown on the inside. The terminal space white near the apex and also in the middle, which is crossed by four dark dashes. Fringe interlined, dark brown and white at the apex and fuscous behind. Hind wings pale fuscous, paler basally.

Habitat. — Texas. Early stages and food plant unknown.

Prionapteryx incertella.

Chilo incertella Zinck., Germ. Mag., Vol. IV., p. 253 (1821).
Prionopteryx incertella Zell., Chil. et Cram., p. 14 (1863).
Prionopteryx incertella Robs., Ann. Lyc. N. H. of N. Y., Vol. IX., p. 311 (1869).
Prionopteryx olivella Grote, Bull. U. S. Geo. Sur., Vol. VI., p. 274 (1881).

Expanse of wings, 19–25 mm. Palpi, head, thorax and fore wings olive fuscous, the olive tint more apparent in fresh specimens. The fore wings have a pale shade along the submedian fold from the base outwardly; a pale-yellow or whitish mark on the middle of the costa, and a larger one beyond it at the outer third; an outwardly curved line from

the costa to near the middle of the outer margin. Subterminal line pale, bent outwardly above the median fold and running inwardly below it to the hind margin, just within the anal angle, dentate through the latter part of its course; a fuscous blotch on the hind margin at the basal fourth, and another at the middle, which borders outwardly a very fine angulated line connecting with the first costal mark. The terminal line fine, occurring only on the hind part of the outer border. Fringes pale at base, fuscous outwardly. Hind wings pale fuscous.

Habitat.—North Carolina, Georgia, Illinois. Early stages and food plant unknown.

I have carefully examined the types of Zeller and Grote.

EUGROTEA n. gen.

Head medium; face cone-shaped; eyes hemispherical; ocelli present; antennæ simple in the female, male not seen; labial palpi porrect, about three times as long as the head, coarsely haired; maxillary palpi triangularly scaled, about twice as long as the head; tongue well developed; thorax and abdomen smooth; legs of medium length and size; inner spurs one-third longer than the outer. Fore wings two and one-half times as long as wide, with twelve veins; 4 and 5 on a long stalk, 7, 8 and 9 from one stalk; the outer margin notched at the end of vein 4. Hind wings one and a half times as long as wide, with eight veins; 4 and 5 from a long stalk; cell closed.

I have named this genus in honor of my old friend, Prof. A. R. Grote, who years ago advised me to take up the study of the North American microlepidoptera, and has ever since taken a lively interest in my work.

Eugrotea dentella n. sp. (Plate VI., fig. 5.)

Expanse of wings, 25 mm. Head, thorax and palpi white, heavily sprinkled with dark-brown scales. Fore wings white, marked with dark brown (olivaceous in certain lights) on the basal half of the costa down to the cell; on the basal third of the hind margin, a more or less zigzag or dentate cross-stripe a little beyond the middle, a second irregular cross-stripe

between the last and the outer margin, one or two oblique stripes near the apex and the terminal line, are all brown. There are also more or less brown scales sprinkled over the white portions of the wing. In this respect there is a great deal of variation. Fringes pale at the base, fuscous outwardly. Hind wings pale fuscous, with finely interlined fringes.

Habitat. — Florida. Early stages and food plant unknown.

PSEUDOSCHŒNOBIUS N. GEN.

Head medium; face cone-shaped; eyes hemispherical; ocelli present; antennæ (Plate B, fig. 16) finely toothed and ciliate, about two-thirds the length of the costa; labial palpi porrect, about three times the length of the head; maxillary palpi triangular, about as long as the head; tongue rudimentary; thorax smooth; legs long and slim, all the inner spurs twice as long as the outer; abdomen long and slim.

Fore wings (Plate C, fig. 8) three and a half times as long as wide; outer margin falcate and apex rounded; eleven veins, 4 and 5 from one point, 6 and 7 from a short stem, 8 and 9 from one stem; 11 arises from the outer third of the cell and runs into 12, fusing with it from the point of junction to the costa; 1 *a* is nearly half as long as the wing; 1 *b* is simple at the base. Hind wings (Plate C, fig. 9) triangular, not quite twice as long as wide; veins 4 and 5 coalesce, forming but one vein, 6 remote from 7; median vein above pectinated basally. This genus was first proposed in Smith's "List of the Lepidoptera," 1891, for *opalescalis*, a species described by Hulst, from Arizona, and placed under *Schœnobius;* but, as the structure of the insect gave it no abiding place in any genus already established, we have now characterized this new genus for it.

PSEUDOSCHŒNOBIUS OPALESCALIS. (Plate VI., fig. 13.)

Schœnobius opalescalis Hulst, Trans. Am. Ent. Soc Vol. XIII., p. 167 (1886).

Expanse of wings, 29 mm. Palpi dark fuscous, cinereous above; head and thorax cinereous, the tegulæ edged with white; abdomen fuscous, annulate with cinereous; fore wings cinereous, with white scales scattered profusely between the veins; fringe of the same color as the wings. Hind wings above and beneath light fuscous, somewhat opalescent. Under side of fore wings fuscous, paler towards the apex. Described from six examples in my collection, from Arizona; one in the collection of the National Museum, from the Argus Mountains, Cal.; and the type in the collection of Mr. Hulst.

CRAMBUS FABRICIUS.

Head medium; face rounded, more or less swollen or cone-shaped; eyes more or less hemispherical; ocelli present; antennæ about two-thirds as long as the costa, dentate or ciliate in the male (Plate B, fig. 17), simple in the female (Plate A, fig. 9); labial palpi very long, porrect; maxillary palpi moderately long, porrect, triangularly dilated with scales (Plate C, fig. 16); tongue well developed; thorax smooth; abdomen of the male with a small anal tuft.

Fore wings from two to three times as long as wide, with twelve veins; 4 and 5 sometimes from a stalk; 7, 8 and 9 from a common stalk; 11 bent more or less and sometimes connected with 12. Hind wings about one and one-half times as long as wide; veins 4 and 5 from one point or from a stalk.

This genus contains by far the largest number and the most common of our species. From the studies of Riley, Lintner, Forbes, Felt, Beckwith and Miss Murtfeldt, we know something of the early stages of a large number of our species.

Synopsis of the Species.

1. Fore wings with ground color whitish, ... 2.
 Fore wings with ground color ochreous, brown or gray, . 6.
2. Fore wings without markings or terminal dots, . . *perlellus.*
 Fore wings with markings or terminal dots, ... 3.
3. Fore wings with a longitudinal reddish stripe near the middle, *girardellus.*
 Fore wings with a terminal and a subterminal row of black dots, ... *turbatellus.*
 Without these characters, ... 4.
4. Subterminal line slightly curved, ... *elegans.*
 Subterminal line strongly angulated, ... 5.
5. Median line widest on the hind margin, . . . *pusionellus.*
 Median line not reaching the hind margin, . . . *albellus.*
6. Fore wings with a white stripe from base to middle or beyond, ... 7.
 Fore wings without such stripe, ... 28.
7. The median white stripe wide and crossed by two oblique bars, ... 8.
 The median white stripe not crossed by two oblique bars, . 9.
8. The inner bar on the middle of the wing, . . . *myellus.*
 The inner bar beyond the middle of the wing, . *luctiferellus.*
9. Median stripe extended to terminal line, but divided outwardly, ... *dimidiatellus.*
 Median stripe extended undivided to terminal line, *unistriatellus.*
 Median stripe not reaching terminal line, ... 10.
10. Stripe divided into costal and subcostal stripes, . . . 11.
 Stripe not divided, ... 15.
11. Hind wings pure white, ... *multilineellus.*
 Hind wings not pure white, ... 12.
12. Apex of fore wing strongly acuminate, . . . *minimellus.*
 Apex of fore wing not strongly acuminate, ... 13.
13. Terminal dots preceded by black lines, . . . *laqueatellus.*
 Terminal dots not preceded by black lines, ... 14.
14. Outer border notched on vein 6, ... *dumetellus.*
 Outer border straight or nearly so, . . . *agitatellus.*
15. Median stripe with a tooth near middle of costal edge, *carpenterellus.*
 Median stripe without a costal tooth, ... 16.

16. { Hind margin of fore wings more or less white, . . . 17.
Hind margin of fore wings not marked with white, . . 19.

17. { Hind marginal streak entire, ... *pascuellus.*
Hind marginal streak interrupted, ... 18.

18. { Fore wings bright brown, ... *dissectus.*
Fore wings dark brown, ... *labradoriensis.*

19. { Apex strongly acuminate; tooth of stripe long, . *satrapellus.*
Apex not strongly acuminate; tooth not long, . . . 20.

20. { Hind wings pure white, ... 21.
Hind wings not pure white, ... 24.

21. { White stripe short and wide, with the tooth near the end, *bidens.*
White stripe with tooth small and near the middle, . . 22.

22. { Apex acuminate, ... *hastiferellus.*
Apex not acuminate; slightly emarginate, ... 23.

23. { White stripe wide, very near the costa, . . . *leachellus.*
White stripe narrower; more remote from costa, . *præfectellus.*

24. { White stripe narrower than the costal border, . *argillaceellus.*
White stripe wider than the costal border, ... 25.

25. { White stripe more than two-thirds as long as the wing, . 26.
White stripe not more than two-thirds as long as the wing, *alboclavellus.*

26. { Under side of cell marked with black, . . . *occidentalis.*
Under side of cell not marked with black, ... 27.

27. { Fore wings ochreous cinereous, ... *cypridalis.*
Fore wings brown, ... *hamellus.*

28. { Terminal line present above, with three or four dots below, 29.
Terminal row of three or four dots below and none above, . 30.
Terminal row of seven dots, ... 31.
Terminal line more or less indistinct, ... 44.

29. { Outer margin falcate, ... *gausapalis.*
Outer margin not falcate, ... *hortuellus.*

30. { Fringes of fore wings cut with whitish, ... *trisectus.*
Fringes of fore wings not cut with whitish, . . *laciniellus.*

31. { Veins in the middle of fore wing whitish, ... 32.
Veins in the middle of fore wing not whitish, . . . 33.

32. { Veins of hind portion light, edged with black scales, *coloradellus.*
Veins of hind portion light, but not edged with black scales, *bolterellus.*
Veins of hind portion not light, ... *albilineellus.*

33. { Fringes golden yellow, ... 34.
Fringes not golden yellow, ... 37.

34. Without median or subterminal lines, . . . *vulgivagellus.*
With cross lines, ... 35.

35. Terminal space a brighter yellow than rest of wing, *decorellus.*
Terminal space of the same shade as rest of wing, . . 36.

36. Subterminal line narrow, ... *ruricolellus.*
Subterminal line broad, ... *biothanatalis.*

37. Several heavy brown stripes between the lines, . . *hulstellus.*
Without brown stripes between the cross lines, . . . 38.

38. Subterminal line finely dentate, ... 39.
Subterminal line not dentate, ... 40.

39. Bright yellow along the submedian fold, . . *hemiochrellus.*
Submedian fold not bright yellow, ... *mutabilis.*

40. Subterminal line very near the outer margin, . *attenuatus.*
Subterminal line not very near the outer margin, . . . 41.

41. With white lines through the middle, . . . *haytiellus.*
Without white lines through the middle, ... 42.

42. Top of the head and thorax white, ... *teterrellus.*
Top of the head and thorax not white, ... 43.

43. Fore wings reddish brown, ... *anceps.*
Fore wings grayish, ... *undatus.*

44. Dark brown with white median shade and subterminal line, *trichostomus.*
Without white median shade, ... 45.

45. Median white stripe from base of wing, . . . *oregonicus.*
Without median white stripe, ... 46.

46. Fore wings with a white point near the end of the cell, *bonifatellus.*
Fore wings dark brown, ... *caliginosellus.*
Fore wings ashy gray, ... *zeëllus.*
Fore wings ochreous yellow, ... 47.

47. Median and terminal spaces slightly ashy *ulæ.*
Median and terminal spaces not ashy, . . . *luteolellus.*

Crambus satrapellus. (Plate I., fig. 1.)

Chilo satrapellus Zinck., Germ. Mag., Vol. IV., p. 247 (1821).
Crambus satrapellus Zell., Chil. et Cram., p. 16 (1863).
Crambus aculeilellus Walk., Lep. Het., Vol. XXVII., p. 158 (1863).
Crambus elegantellus Walk., Lep. Het., Vol. XXVII., p. 179 (1863).
Crambus elegantellus Robs., Ann. Lyc. N. Y., Vol. IX., pp. 315, 316 (1869).
Crambus satrapellus Felt, Grass-eating Ins., p. 89 (1894).

Expanse of wings, 25–35 mm. Head and palpi yellowish gray; thorax light golden yellow; labial palpi slender, about the length of the thorax, pale cinereous fuscous on the outside, the under margin whitish. Fore wings much produced at the apex, golden yellow, rust brown on the costa; from the base to near the outer margin a sharply pointed, silvery-white stripe, with a long, acute tooth projecting on the under side, from the middle nearly to the subterminal line. Above its apex, and parallel with it, a small spindle-shaped, silvery-white stripe. Both stripes bordered with rust brown. Subterminal line with a very acute angle near the outer margin, just below the apex. Costal half of apex dark brown, outer marginal half white. Fringes, white next the terminal line, brown outwardly. Hind wings pale cinereous; fringes white. Abdomen and legs grayish white.

Habitat. — Florida, Georgia, Texas. Food plant and early stages unknown.

Crambus hastiferellus. (Plate I., fig. 4.)

Crambus hastiferellus Walk., Lep. Het., Vol. XXVII., p. 155 (1863).
Crambus quinquareatus Zell., Ex. Mic., p. 38, Plate I, fig. 16 (1877).
Crambus extorralis Hulst, Tr. Am. Ent. Soc., Vol. XIII., p. 165 (1886).

Expanse of wings, 16 mm. Head, palpi and thorax above, golden fuscous; abdomen white with fuscous annulations. Fore wings golden fuscous, darker on the costa nearly to the terminal line. A broad, silvery-white stripe, nearly reaching the costa and basally bordered with a dark line, extends from the base nearly to the subterminal line, taper-

ing bluntly at the tip, which rests upon a cream-colored stripe extending across the line and there uniting with a white sub-apical spot. Subterminal line very oblique in its first third from the costa, then from an obtuse angle it runs straight, with the exception of a small blunt tooth, to the inner margin. Above the dark apical dash, a light triangular spot. Terminal space, below the light stripe, brown with a few dark lines. Below the silvery stripe the wing is lighter in color, with a darker wedge-shaped space on the outer part. Terminal line dark, brownish ochreous. Fringes metallic. Hind wings white.

Habitat. — Nova Scotia, Pennsylvania, Florida, Louisiana, Texas, California. Food plant and early stages unknown.

Crambus occidentalis. (Plate II., fig. 3.)

Crambus occidentalis Grote, Can. Ent., Vol. XII., p. 16 (1880).
Crambus occidentalis Grote, Can. Ent., Vol. XIII., p. 66 (1881).

Expanse of wings, 16 mm. Head, palpi and thorax above, ochreous brown. Fore wings ochreous, heavily dusted with fuscous; the white streak in the costal half of the wing dilated in the middle, with a prominent tooth on the lower side, which is bordered with a heavy, dark-brown shade, especially from the tooth to the base. The subterminal line forms an acute angle under the apical patch. Apex light, with a dark shaded patch in the centre. Five dark-brown venular dots in the terminal space. Hind wings pale fuscous.

Habitat. — California. Food plants and early stages unknown.

It differs from the other species in the prominent notch or tooth at the middle of the lower side of the white stripe, and by the heavy dark shades below the stripe.

Crambus minimellus. (Plate II., fig. 2.)

Crambus minimellus Robs., Ann. Lyc. N. Y., Vol. XI., p. 315 (1869).
Crambus minimellus Felt, Grass-eating Ins , p. 88 (1894).

Expanse of wings, 13–15 mm. Head, palpi and thorax dark shining fuscous. Fore wings glossy fuscous, with a

whitish stripe above the middle of the wing and below two fuscous longitudinal lines on the upper part; this whitish stripe extends from the base nearly to the subterminal line, where it ends acutely in a dark line reaching to the end of the wing. Bordering the acute end of the stripe, above and below, are two small, white, wedge-shaped spots, pointing inwardly. A diamond-shaped, silvery-white spot in the apex of the wing, with a dark streak and lighter patch above it. Median line dark brown, arising from the middle of the costa and sending a very acute angle outward, which encloses the end of the white stripe and gives off two outward and one inward acute angles below the stripe, and ends near the middle of the hind margin. Subterminal line, bordered on each side with white in the first part of its course, arises from the outer fourth of the costa and runs obliquely out beyond the end of the stripe, where it forms a right angle and extends to the hind margin within the anal angle, giving off a tooth inwardly in the middle of its course.

Habitat. — New York, Pennsylvania, Texas, Illinois. Early stages and food plant unknown.

Crambus argillaceëllus. (Plate II., fig. 1.)

Crambus argillaceëllus Pack., Pr. Bos. Soc. N. H., Vol. XI., p. 54 (1866).

Expanse of wings, 16 mm. Head, thorax and outside of the palpi cinereous brown, with a slightly bronzed hue. Fore wings cinereous brown, with a narrow white stripe increasing in width for one-half the length of the wing, when it tapers off acutely on the outer fourth; a brown apical patch on the costa, with a white one below it. Subterminal line forming a right angle at its costal third. Terminal space, below the apical spots, dark; two or three short white parallel lines run from the tip of the white stripe to the subterminal line. Fringes much paler. Hind wings dark, argillaceous above and beneath. Differs from all other species in its peculiar dark hue, especially on the hind wings.

Habitat. — Labrador. Early stages and food plant unknown.

Crambus hamellus. (Plate II., fig. 4.)

Tinea hamellus Thunb., Diss. Ent., p. 97, Plate IV., fig. 3 (1794).
Tinea Ensigerella Hüb., Tinea, Plate LIV., fig. 267 (1803).
Chilo Ensigerellus Zinck., Germ. Mag., Vol. II., p. 53 (1817).
Chilo ensigerellus Tr., Schm., Vol. IX., part 1, p. 79 (1832).
Crambus Ensigerellus Dup., Nat. Hist. Lep., Vol. X., p. 57, Plate CCLXXV. (1836).
Crambus Hamellus H. S., Vol. IV., p. 53 (1849).
Crambus Hamellus Wood, Ind. Ent., p. 215, No. 491 (1854).
Crambus hamellus Staint., Man., Vol. II., p. 181 (1859).
Crambus hamellus Zell., Chil. et Cram., p. 17 (1863).
Crambus Hamellus Hein., Schm., Vol. I., p. 119 (1865).
Crambus hamellus Meyr., Handb. Br. Lep., p. 389 (1895).

Expanse of wings, 20–23 mm. Palpi shining fuscous on the outside; head ashy brown; thorax and fore wings brownish cinereous; a snow-white stripe from the base to a point a little within the subterminal line, giving off a strong tooth near the middle; costal margin narrow at the base, widening outwardly, and where the white stripe begins to taper the costal stripe is about as wide as the white stripe; a very small oval streak above the end of the white stripe, sometimes reaching it. Subterminal line brown, bordered with white on each side, at the costa, and edged outwardly with dark lead-colored scales, extending down to a point beyond the end of white stripe, where it forms an obtuse angle, and then crosses the wing in a nearly straight line. Terminal space dark brown with a white triangle reaching to the apex; below, ashy, with five elongate black spots. Terminal line above, dark brown. Fringes metallic gray, white at base, above. Hind wings pale fuscous; fringes lighter.

Habitat. — Maine, Europe. Early stages and food plant unknown.

Crambus cypridalis. (Plate III., fig. 1.)

Crambus cypridalis Hulst, Tr. Am. Ent. Soc., Vol. XIII., p. 165 (1886).

Expanse of wings, 30 mm. Head and palpi cinereous fuscous, whitish above; thorax and abdomen ochreous. Fore wings ochreous fuscous; a silvery-white stripe bordered with a very dark brown line extends from the base nearly to the subterminal line, tapering acutely at the outer end; above this portion another small, tapering white stripe. Terminal line forming a blunt angle at about one-third the width of the wing from the costa. Apex white, with a dark-brown patch. Five fine black lines between the veins in the terminal space. Fringe fuscous, with a white line at the base. Hind wings cream white.

Habitat. — Utah. Early stages and food plant unknown.

Crambus carpenterellus. (Plate I., fig. 5.)

Crambus carpenterellus Pack., Rep. Hayd. Surv., p. 548 (1873).

Expanse of wings, 28 mm. Head, palpi and thorax tawny ochreous. Fore wings ochreous fuscous, with a white stripe starting from the base and extending to near the subterminal line, where it ends in a point; at the basal third, a tooth on the costal side, and another one at the outer third on the opposite side, which ends in a dark line extending half the distance to the cross-line. Between this line and the point of the streak three other dark lines, parallel to this and gradually growing shorter, arise from the white streak. Below the streak the wing is lighter in color than elsewhere. Subterminal line bordered with white on the costa, slightly curving in its first third, nearly straight the remainder of its course and followed outwardly by a silvery line. Upon the apex a brown triangle with a white triangle above it. A series of five dark-brown marginal dashes. Fringes silvery fuscous. Hind wings much paler.

Habitat. — Mountains of Colorado. Early stages and food plant unknown.

Crambus pascuellus. (Plate I., fig. 3.)

Phalæna Tinea pascuella Linn., Syst. Nat., ed. X, p. 535 (1758).
Tinea pascuella Linn., Faun. Suec., ed. II., p. 355 (1761).
Tinea pascuella Fab., Syst Ent., p. 658 (1775).
Tinea Pascuella Wein. Verz., p. 134 (1776).
Tinea Pascuella Goeze, Ent. Beitr., Vol. III., part 4, p. 85 (1783).
Tinea Pascuella DeVillers, Ent. Linn., Vol. II., p. 460 (1789).
Tinea Pascuella Fab., Ent. Syst., Vol. III., part 2, p. 295 (1793).
Tinea Pascuella Schrank, Faun. Boic., Vol. II., part 2, p. 100 (1802).
Tinea Pascuella Hüb., Tinea, Plate V., fig. 51 (1803).
Chilo Pascuellus Zinck., Germ. Mag., Vol. II., p. 49 (1817).
Chilo pascuellus Tr., Schm., Vol. IX., part 1, p. 75 (1832).
Crambus pascuellus Steph., Ill. Br. Ent. Haust., Vol. IV., p 320 (1834).
Crambus pascuellus Dup., Nat. Hist. Lep., Vol. X., Plate CCLXIX., fig. 1 (1836).
Crambus Pascuellus H. S., Schm., Vol. IV., p. 53 (1849).
Crambus Pascuellus Wood, Ind. Ent., p. 215 (1854).
Crambus pascuellus Staint., Man., Vol. II., p. 181 (1859).
Crambus pascuellus Zell., Chil. et Cram., p. 20 (1863).
Crambus Pascuellus Hein., Schm., Vol I., p. 120 (1865).
Crambus pascuellus Praun, Tineidæ, Plate I., fig. 15 (1869).
Crambus floridus Zell., Beitr., Vol. I., p. 91 (1875).
Crambus floridus Felt, Grass-eating Ins., pp. 78, 86 (1894).
Crambus pascuellus Meyr., Handb. Br. Ent., p. 390 (1895).

Expanse of wings, 21–24 mm. Palpi fuscous on the outside; head white above; thorax white above and beneath, brownish ochreous on the sides. Fore wings brownish ochreous, with a broad white stripe extending through the wing very near the costa, and ending in an acute angle a short distance within the subterminal line; costal margin brownish fuscous, widening outwardly, but in no place more than half as wide as the white stripe; four or five silvery, black-margined streaks on the outer part of the wing, but not reaching the subterminal line; a white spot beyond and below the end of the white stripe; a white spot on each side of the subterminal line, on the costa. Subterminal line fuscous, arising a little beyond the outer fourth of the costa, extends outwardly to a point beyond the end of the white stripe, where it forms an obtuse angle and crosses the wing to the hind margin. Subterminal space below ashy gray,

with four or five black terminal points. Apex white, triangularly produced, with a terminal dark-brown line, a yellowish-brown costal spot and oblique streak before it. Fringes metallic gray, white at base above. Hind wings whitish, pale fuscous apically; fringes white.

Habitat. — Massachusetts, Texas, California, Europe. Food, grass.

"*Egg.* — Creamy white when first laid, gradually turning to a dark scarlet color before hatching. Form, elliptical oval; size, .39 mm. by .30 mm. The egg-shell has sixteen feeble longitudinal ridges and numerous smaller transverse ridges.

"*Larva, First Stage.* — Head diameter, .21 mm.; body diameter, .15 mm.; length, 1.15 mm. Head black, labrum yellowish, scattered hairs on the head; thoracic shield dark brown; body straw color with fine reddish blotches, giving it a pinkish cast. Scattered hairs grow from small tubercles. When about two weeks old the body is a dark mottled brown When a month old the larva is 1 cm. long." (Felt.)

Crambus girardellus. (Plate I., fig. 13.)

Crambus Girardellus Clem., Pr. Ph. Ac. Sci., p. 204 (1860).
Crambus nivihumellus Walk., Lep. Het., Vol. XXVII., p. 159 (1863).
Crambus girardellus Felt, Grass-eating Ins., pp. 73, 86 (1894).

Expanse of wings, 23–25 mm. Labial palpi pale fuscous on the sides, silvery white above and beneath; thorax whitish above, orange-yellow on the sides; abdomen white. Fore wings silvery white, with an orange-yellow stripe, bordered outwardly with dark-brown scales, extending from the base of the wing, beneath the median vein, to beyond the cell, where it turns up toward the apex of the wing. Terminal line brown, edged with yellow, with five short, dark-brown dashes before it on the posterior half of the wing. Hind wings pure white, sometimes smoky on the anterior half.

Habitat. — St. Martin's Falls, Albany River, Hudson's Bay, Ontario, Maine, New Hampshire, Massachusetts, New York, Pennsylvania, Maryland, Ohio. Food, grass.

"*Egg.* — Creamy white when first laid, but gradually changing to bright orange before hatching. Form, elliptical oval; size, .51 mm. by .33 mm. The egg-shell has seventeen longitudinal ridges and numerous smaller transverse ridges.

"*Larva, First Stage.* — Head diameter, .24 mm.; length, 1.05 mm. Head and thoracic shield a glistening black, body a reddish straw color; scattered hairs occur on the head and body; the hairs on the body grow from minute tubercles, which are concolorous with the body. When about a month old the larvæ are 2 cm. long. The head is yellowish, with irregular brown markings; the body is a slate color, with brown tubercles." (Felt.)

Crambus leachellus. (Plate I., fig. 2.)

Chilo Leachellus Zinck., Germ. Mag., Vol. III., p. 114 (1818).
Crambus pulchellus Zell., Chil. et Cram., p. 18 (1863).
Crambus pulchellus Zell., Beitr., p. 89 (1872).
Crambus leachellus Felt, Grass-eating Ins., pp. 71, 85 (1894).

Expanse of wings, 24–30 mm. Head and thorax brassy brown; palpi brownish cinereous. Fore wings golden fuscous, with a broad silvery-white stripe, bordered by a fine dark line, extending outward from the base and ending in a point near the subterminal line; basal stripe narrow, less than half the width of the white stripe at the costa. A very small tooth in the middle on the lower side; a very small, spindle-shaped white spot above the outer end of the white stripe, sometimes connected with it; subterminal line brownish, edged outwardly by a silvery streak, arising from the outer fourth of the costa, forming an angle near the point of the white stripe, thence running straight across the wing and terminating just within the anal angle; from the end of the white streak a pale yellowish stripe extends outward to the terminal line, curving upward to the apex, above which is a brown triangular patch separated from the costa by a small white triangle. Subterminal space below ashy brown, with four or five indistinct black dashes. Terminal line golden fuscous. Fringes grayish metallic, white at base above.

Hind wings white in female, slightly yellowish in the male.

Habitat. — Ontario, Maine, Massachusetts, New York, New Jersey, Pennsylvania, Georgia, Texas, Illinois, California, Vancouver Island, Venezuela, Mendocino.

"*Egg.* — Creamy white in color when first laid, quickly changing to a scarlet and then to an intense geranium red; just before hatching the blackish head of the embryo shows through the thin shell very distinctly. Form nearly oval; size, .51 mm. by .39 mm. The egg-shell is quite fragile, and frequently collapses when the larva leaves it. There are twenty-two longitudinal ridges and numerous smaller transverse ridges. The circular markings around the micropyle are very characteristic.

"*Larva, First Stage.* — Head diameter, .21 mm.; body diameter, .18 mm.; length, 1 mm. Head a brownish black, clypeus yellowish, antennæ nearly colorless; scattered hairs occur on the head; thoracic shield brown, with a reddish tinge from the body contents; body a variable red, the color being the most intense in the thoracic region; there is a slight stigmatal line; tubercles blackish and bearing dark hairs; prolegs almost rudimentary. When about a month old the larvæ are 1.5 cm. long; the head is yellowish, with irregular black markings; the body is brown, with large blackish tubercles. When about six weeks old the larvæ are 3 cm. long and quite stout; the color has not changed." (Felt.)

Crambus unistriatellus. (Plate I., fig. 6.)

Crambus unistriatellus, Pack., Pr. Bos. Soc. N. H., Vol. XI., p. 54 (1866).
Crambus exesus Grote, Can. Ent., Vol. XII., p. 16 (1880).
Crambus exesus Grote, N. A. Ent., Vol. I., p. 68, Plate V., fig. 7 (1880).
Crambus unistriatellus Felt, Grass-eating Ins., p. 85 (1894).

Expanse of wings, 25 mm. Head, palpi and abdomen very pale gray; palpi long, slender, acute; thorax and fore wings golden yellow, with metallic lustre. A broad, uninterrupted silvery-white band on each side, with a few dark scales, extends to the outer edge of the wing, expanding upwards on

the apex; edge of the brown stripe above the silvery band bordered with a few white scales towards the apex. A submarginal row of minute black dots. Fringe concolorous with the rest of the wing. Hind wings white above and beneath. Under side of fore wings and the legs pale gray.

Habitat. — Labrador, Maine, New Hampshire, New York, Pennsylvania, Minnesota, California. Early stages and food plant unknown.

Crambus præfectellus. (Plate I., fig. 7.)

Chilo præfectellus Zinck., Germ. Mag., Vol. IV., p. 248 (1821).
Crambus involutellus Clem., Pr. Ph. Ac. Sci., p. 203 (1860).

Expanse of wings, 21–25 mm. Head, palpi and thorax cinereous with bronze lustre. Fore wings golden fuscous, with a silvery-white stripe bordered with a fine darker line, and tapering toward each end, from the base to near the subterminal line; a tooth in the middle on the lower side; a dark shade, with a light costal triangle above it and a light patch below it, extends from the apex to the subterminal line; costal margin wider than in *leachellus*, being more than one-half the width of the white stripe at the middle of the costa; subterminal space with four dark venular dashes. Fringes grayish metallic, with a white line at the base. Hind wings white or slightly cream colored; fringes white.

Habitat. — Canada, Massachusetts, New York, New Jersey, Colorado, Texas. Early stages and food plant unknown.

Crambus dissectus. (Plate II., fig. 12.)

Crambus dissectus Grote, Can. Ent., Vol. XII., p. 66 (1880).

Expanse of wings, 20 mm. Head and palpi above, white; thorax brown on the sides, white above; abdomen whitish, mottled with brown. Fore wings light brown. A white stripe, very narrow at the base and much dilated in the middle of the wing, where it sends out a long acute tooth behind. The hind margin white, more or less broken. Several very dark-brown parallel dashes run from the white stripe nearly to the subterminal line, and upon these dashes a white, diamond-shaped patch. On the costa, on each side

of the subterminal line, is a white patch. Apex brown, with a white patch below it. Terminal space with a white streak enclosing five very dark-brown dots. Fringes metallic, except at the base of apex. Hind wings smoky fuscous, with pale fringes.

Habitat. — Maine, New York. Early stages and food plant unknown.

Crambus bidens. (Plate I., fig. 8.)

Crambus bidens Zell., Beitr., p. 89 (1872).
Crambus bidens Grote, Can. Ent., Vol. XII., p. 77 (1880).

Expanse of wings, 18 mm. Head and thorax lustrous ochre-yellow; palpi acute, ochre-yellow. Fore wings bright ochre-yellow, with a few rust-brown scales. A few light patches on the inner margin. A very broad silvery-white stripe extends to the costa on one-half the length of the wing, then turns obliquely in a straight line. On the inner side it sends out an acute tooth, then runs in a straight line and meets the costal line at an acute point near the angle of the subterminal line. This line runs obliquely for one-third of its length, then, forming an obtuse angle, runs in a straight line an equal distance, where it forms a very blunt tooth and continues to the inner margin. On the costa a white spot on each side of the subterminal line; also one below the brown apex, and a larger one enclosing five dark-brown dots in the terminal space. Hind wings white, slightly dusted with ochreous.

Habitat. — Massachusetts, New York. Early stages and food plants unknown.

Crambus labradoriensis. (Plate III., fig. 7.)

Crambus Labradoriensis Chris., Stett. Ent. Zeit., Vol. XIX., p. 314 (1858).
Crambus labradoriensis Möschl., Wien. Monats., Vol. IV., p. 379 (1860).
Crambus labradoriensis Zell., Chil. et Cram., p. 21 (1863).
Crambus labradoriensis Pack., Pro. Bos. Soc. N. H., Vol. XI., p. 55 (1866).

Expanse of wings, 18–20 mm. Head and thorax fuscous brownish; lateral margin of the face, palpi above and beneath, at the base, and the apices of the scapulæ, white.

Fore wings slightly emarginate, long and rather narrow, ashy fuscous, mingled outwardly with clay yellow. Median white stripe narrow, remote from the costa, and ending near the middle of the wing in a bidentate apex. Whitish scales in spots and lines between the fuscous spot at the end of the stripe and the subterminal line, which is silvery and extends from the outer fourth of the costa to a point beyond the end of the white stripe, where it forms an obtuse angle and continues in a straight line to the hind margin, within the anal angle. Terminal space white, overlaid more or less, next to the subterminal line, with the ground color of the wing; a dark-brown costal triangle just within the apex. Terminal line dark brown above, followed by fine dark-brown dots. Fringes dark silvery gray. Hind wings fuscous cinereous.

Habitat. — Labrador, Ontario, Oregon. Early stages and food plant unknown.

Crambus dumetellus. (Plate III., fig. 2.)

Tinea Dumetella Hüb., Tineæ, Plate 58, figs. 389, 390 (1803).
Tinea Pratella Hüb., Tineæ, Plate V., fig. 29 (1803).
Argyroteuchia Dumetalis Hüb., Verz., p. 364 (1818).
Agriphila Pratalis Hüb., Verz., p. 365 (1818).
Chilo dumetellus Tr., Schm., Vol. IX., p. 80 (1832).
Crambus Dumetellus Steph., Ill. Br. Ent. Haust., Vol. IV., p. 321 (1834).
Crambus dumetellus Dup. Nat. Hist. Lep., Vol. X., p. 52, Plate CCLXIX. (1836).
Crambus Dumetellus H. S., Schm., Vol. IV., p. 54 (1849).
Crambus Dumetellus Wood, Ind. Ent., p. 215, No. 1493 (1854).
Crambus dumetellus Staint., Man., Vol. II., p. 181 (1859).
Crambus dumetellus Zell., Chil. et Cram., p. 24 (1863).
Crambus Dumetellus Hein., Schm., Vol. I., p. 122 (1865).
Crambus dumetellus Praun, Tineidæ, Plate 1, fig. 16 (1869).
Crambus trichusalis Hulst, Tr. Am. Ent. Soc., Vol. XIII., p. 165 (1886).
Crambus dumetellus Meyr., Handb. Br. Ent., p. 391 (1895).

Expanse of wings, 20–25 mm. Palpi, head and thorax ochreous brown, the palpi somewhat darker on the outside. Fore wings ochreons brown, or dark ochreous brown, with a narrow costal white stripe extending nearly to the middle; a median white stripe extending from the base outward along

the cell, giving off a small tooth near the middle, and cut off more or less obliquely at the outer end, a little below and beyond which is another white streak; subterminal line dark brown, edged outwardly with metallic scales, arising at the outer fourth of the costa, where it is preceded by a white costal spot, and extending to a point beyond the end of the white stripe, then, forming an acute angle, extends with a slight inward curve to the hind margin. Subterminal space below ashy gray, with five more or less distinct terminal black points. Terminal line above dark brown; apical space occupied by two triangles, the lower one white, the upper brown; both separated from the subterminal line by a narrow streak of the ground color of the wing. Fringes silvery fuscous, whitish at the base, emarginate as in *pascuellus*. Hind wings fuscous; fringes lighter.

There are several specimens in the National Museum which are very much darker than any in my possession.

Habitat. — Texas, Colorado, Rocky Mountains, north of Montana (Geddes), Europe. Early stages and food plant unknown.

Crambus gausapalis. (Plate I., fig. 14.)

Crambus gausapalis Hulst, Tr. Am. Ent. Soc., Vol. XIII., p. 167 (1886).

Expanse of wings, 22–24 mm. Palpi light ochreous, darker on the outside; head and thorax ochreous. Fore wings light ochreous, with scattered specks of brown; dark ochreous lines dusted with brown on all the veins beyond the cell; median line ochre-yellow, running obliquely from the middle of the costa about half-way to the apical angle, then, with a sharp angle, back to the cell, where, with another acute angle, it turns toward the outer margin but runs only a short distance. Subterminal line brown, edged outwardly with silvery scales, running evenly from the costa to near the outer margin, where it curves and runs to the hind margin. Terminal space darker, sprinkled with white; terminal line dark brown, replaced below by four dark-brown dots; outer margin falcate, apex acute; apical space light, with a large dark-brown patch on the costa. Fringes golden cinereous, with white at the base above.

Hind wings very pale gray, with a trace of the subterminal line below the apex; fringes lighter.

Habitat. — Sierra Nevada Mountains, California. Early stages and food plant unknown.

Crambus laqueatellus. (Plate I., fig. 11.)

Crambus laqueatellus Clem., Pr. Ph. Ac. Sci., p. 203 (1860).
Crambus semifusellus Walk., Lep. Het., Vol. XXVII., p. 159 (1863).
Crambus laqueatellus Zell., Chil. et Cram., p. 24 (1863).
Crambus laqueatellus Zell., Beitr., Vol. I., p. 91 (1872).
Crambus laqueatellus Felt, Grass-eating Ins., pp. 79, 89 (1894).

Expanse of wings, 23 mm. Head luteous; thorax and palpi fuscous, the latter whitish beneath. Fore wings ochreous, with two silvery-white streaks separated by a fuscous streak; the outer silvery streak margined on the costa with fuscous; the inner one, which extends beyond the apical third, edged on the fold with fuscous. Beneath the fold the wing is pale yellowish with fuscous streaks along the submedian veins. Apex of the wing tinted with ochreous yellow, the veins streaked with silvery white; on the costa near the tip an oblique silvery streak, margined on both sides with fuscous. The subterminal silvery-white line much angulated, bending in below the apex, leaving a large whitish marginal patch streaked with dark parallel lines which end in dots before the terminal line. Fringes lustrous ochreous. Hind wings pale fuscous; fringes white.

Habitat. — Maine, Massachusetts, New York, Ohio, Illinois, Kentucky, Louisiana, Texas. Food, grass.

"*Egg.* — Creamy white when first laid, gradually turning to an orange color before hatching. Form subcylindrical; size, .42 mm. by .30 mm. There are sixteen longitudinal ridges and numerous smaller transverse ridges.

"*Larva, First Stage.* — Head diameter, .18 mm.; body diameter, .15 mm.; length, 1.15 mm. Head brownish black, with whitish hairs; thoracic shield light brown; body mottled with pale bright red and bearing blackish tubercles." (Felt.)

CRAMBUS ALBOCLAVELLUS. (Plate I., fig. 9.)

Crambus alboclavellus Zell., Chil. et Cram., p. 19 (1863).
Crambus alboclavellus Zell., Beitr., p. 92 (1872).
Crambus alboclavellus Felt, Grass-eating Ins., pp. 77, 88 (1894).

Expanse of wings, 18 mm. Palpi pale fuscous, white beneath; head whitish; thorax luteous. Fore wings brownish luteous, with a broad silvery-white stripe extending beyond the middle on the costa to the cell on the hind side, where it forms a tooth; the two sides then run obliquely and meet at an acute angle, the costal line sending out a tooth before meeting the other; beyond the silvery stripe the dark brown shades off into lighter brown or fuscous, and upon this space rest two white spots, one on the costa and one just before the subterminal line; hind margin much lighter, especially toward the base. Subterminal line brown, edged outwardly with silvery white, very straight to the angle under the apex, where it forms almost a right angle, then runs straight to the hind margin. A row of four or five black marginal points below the apex. Fringes with bronze lustre. Hind wings very pale ochreous, lustrous; fringes whitish.

Habitat. — Massachusetts, New York, New Jersey, Virginia, Ohio, Illinois, Kentucky, Texas, Ontario. Food plant, grass.

"*Egg.* — Creamy white when first laid, gradually turning to an orange-buff color before hatching. Form, elliptical oval; size, .42 mm. by .33 mm. There are about sixteen longitudinal ridges and numerous smaller transverse ridges.

"*Larva, First Stage.* — Head diameter, .225 mm.; body diameter, .14 mm.; length, .625 mm. Head a deep brown, thoracic shield a lighter brown; body a straw color, with a reddish mark along the middle of the back from the fourth to the ninth segments inclusive. Scattered light-colored hairs occur on the head and body." (Felt.)

Crambus agitatellus. (Plate I., fig. 10.)

Crambus agitatellus Clem., Pr. Ph. Ac. Sci., p. 203 (1860).
Crambus saltuellus Zell., Chil. et Cram., p. 22 (1863).
Crambus agitatellus Felt, Grass-eating Ins., p. 88 (1894).

Expanse of wings, 21 mm. Head and thorax pale luteous; labial palpi somewhat fuscous, white beneath. Fore wings ochreous, streaked with orange; a broad silvery-white streak, through which runs a longitudinal yellow stripe; a white patch between the silvery stripe and the subterminal line, another on the costa above it, one on the costa of the apex and another on the outer margin just below the brown apex. A whitish or yellow streak with five venular dots in the terminal space. Subterminal line very oblique in its first third from the costa, then straight to the hind margin. Broken fuscous lines specked with silvery scales along the veins above and beneath the middle of the silvery stripe. Fringes metallic, whitish at base of apex. Hind wings pale cinereous; fringes whitish.

Habitat. — Ontario, Maine, Massachusetts, New York, Illinois, Texas. Early stages and food plant unknown.

Crambus multilineëllus. (Plate I., fig. 12.)

Crambus multilineëllus Fern., Ent. Am., Vol. III., p. 37 (1887).

Expanse of wings, 26 mm. Palpi, head and thorax dull ochre-yellow. Fore wings bright ochre-yellow; a white stripe, extending nearly to the apex, leaving the extreme edge of the costa fuscous; a median white stripe from the base of the wing along the lower part of the cell, out as far as the subterminal line, the outer portion separated by an oblique yellow band. This band, between the two white stripes, edged on each side with a fine line of black and metallic lead-colored scales; similar lines along the intervenular spaces. All the lines terminate just before the subterminal line. Three or four oblique yellow lines, edged outwardly with white, cross the outer part of the costal

white stripe. The subterminal line, overlaid with metallic lead-colored scales, runs down near the outer margin of the wing, where it bends and runs to the hind margin, nearly parallel with the outer margin. A terminal row of five black dots. Fringes pale metallic lead color. Hind wings and fringes white. Abdomen, underside of body and the legs dull ochre-yellow.

Habitat. — Florida. Early stages and food plant unknown.

Crambus albellus. (Plate III., fig. 5.)

Crambus albellus Clem., Pr. Ph. Ac. Sci., p. 204 (1860).
Crambus albellus Felt, Grass-eating Ins., pp. 76, 88 (1894).

Expanse of wings, 16 mm. Palpi, head, thorax and abdomen pure white. Fore wings white, with a few dark-brown flecks scattered over the hind portion. An oblique, pale-yellow, acutely angulated line from near the middle of the costa to the cell. The strongly angulated outer line silvery white, bordered on each side with yellow. A yellow line from the costa to the terminal line under the apex. A yellow spot on the apical space. Five black marginal dots, with a short blackish line above. Fringe yellow, with golden lustre. Hind wings pale gray or whitish.

"*Egg.* — Creamy white when first laid, gradually turning to pale straw color before hatching. Form, nearly oval; size, .39 mm. by .33 mm. The egg-shell has eighteen longitudinal ridges and numerous smaller transverse ridges.

"*Larva, First Stage.* — Head diameter, .175 mm.; body diameter, .125 mm.; length, .75 mm. General color a smutty white, head darker, and the thoracic shield a little darker than the body. Scattered brown hairs occur on the head; rows of numerous small tubercles occur on the body." (Felt.)

Habitat. — Maine, Massachusetts, New York, New Jersey, Pennsylvania, Canada, Labrador. Food, grass.

Crambus pusionellus. (Plate III., fig. 6.)

Crambus pusionellus Zell., Chil et Cram., p. 16 (1863).
Crambus pusionellus Zell., Stett. Ent. Zeit., Vol. XXXIII., p. 470, Plate II., fig. 3 (1872).
Crambus pusionellus Zell., Exot. Micro., p. 33 (1877).

Expanse of wings, 15 mm. Palpi white, brownish on the outside; head and thorax white. Fore wings lustrous white, with a few scattered brown scales; median line brown, arising from middle of costa, extending out to the end of the cell, thence nearly straight to the hind margin a little beyond the middle, but broken on the fold, gradually dilated in the latter part of its course; subterminal line brown, double, arising from outer fourth of costa, extending outwardly to near the middle of hind margin, then running to outer fourth of hind margin, giving off an inward angle on the fold. A brown spot on the costa, just before the apex, sometimes extended into a streak. Subterminal space more or less stained with brownish. Terminal line dark brown, with three dark-brown dots above the anal angle. Fringes whitish, more or less stained with metallic fuscous. Hind wings and fringes white.

Habitat. — California. Early stages and food plants unknown.

CRAMBUS HORTUELLUS. (Plate II., fig. 11.)

Tinea Hortuella Hüb., Tineæ, p. 29, Plate VII., figs. 45, 46 (1803).
Tinea Cespitella Hüb., Tineæ, p. 29, Plate VII., fig. 45 (1803)
Tinea Falsella Schrank, Faun. Boic., Vol. II., p. 103 (1804).
Chilo Hortuellus Zinck., Germ. Mag., Vol. II., p. 62 (1817).
Chilo hortuellus Tr., Schm., Vol. IX., p. 84 (1832).
Crambus hortuellus Steph., Ill. Br. Ent. Haust., Vol. IV., p. 322 (1834).
Crambus hortuellus Dup., Nat. Hist. Lep., Vol. X., Plate CCLXIX., fig. 1 (1836).
Crambus Hortuellus H. S , Schm., Vol. IV., p. 59 (1849).
Crambus Hortuellus Wood, Ind. Ent., p. 216, No. 1497 (1854).
Crambus hortuellus Staint., Man., Vol. II., p. 182 (1859).
Crambus hortuellus Zell., Chil. et Cram., p. 24 (1863).
Crambus Hortuellus Hein., Schm., Vol. I., p. 125 (1865).
Crambus topiarius Zell., Stett. Ent. Zeit., Vol. XXVII., p. 155 (1866).
Crambus hortuellus Praun, Tineidæ, Plate II., fig. 3 (1869).
Crambus topiarius Grote, Can. Ent., Vol. XII., p. 17 (1880).
Crambus topiarius Grote, Papilio, Vol. II., p. 74 (1882).
Crambus topiarius Felt, Grass-eating Ins., pp. 75, 87 (1894).
Crambus topiarius Scud., Ins. Life, Vol. VII., p. 1 (1894).
Crambus hortuellus Meyr., Handb. Br. Ent., p. 391 (1895).

Expanse of wings, 16–22 mm. Palpi pale cinereous, shining fuscous on the outside; head and thorax pale cinereous. Fore wings very pale cinereous, gradually changing to ochreous outwardly; intervenular spaces fuscous brown; a brown oblique line, arising a little before the middle of the costa, runs obliquely half way to the cell, then bends toward the submarginal line and nearly joins another oblique costal line of the same color; subterminal line fuscous brown, edged outwardly with dark lead-colored scales, arising from the outer third of the costa, crosses the wings to the outer fourth of the hind margin, forming an obtuse angle in the middle of its course; an oblique leaden streak in the apical portion of the subterminal space. Terminal line black above, followed by three black dots below. Fringes silvery gray. Hind wings pale gray to dark gray, with a darker terminal line not reaching the anal angle; fringes whitish. (Fig. 1, *f.*)

Habitat. — Maine, Massachusetts, New York, California, Europe. Food, grass, cranberry, sheep-sorrel.

"*Egg.* — When first laid, pellucid white, obovate, broadly rounded at both extremities, but slightly more so at base than at summit; broadest barely below the middle, 0.36 mm. high and 0.3 mm. broad, with about twenty-three straight and vertical ribs of slight elevation reaching to the dome of the summit, their interspaces crossed by finer, horizontal, raised cross-lines, which traverse also the vertical ribs, giving them a beaded appearance, the surface thus broken up into quadrangular cells whose length (the width

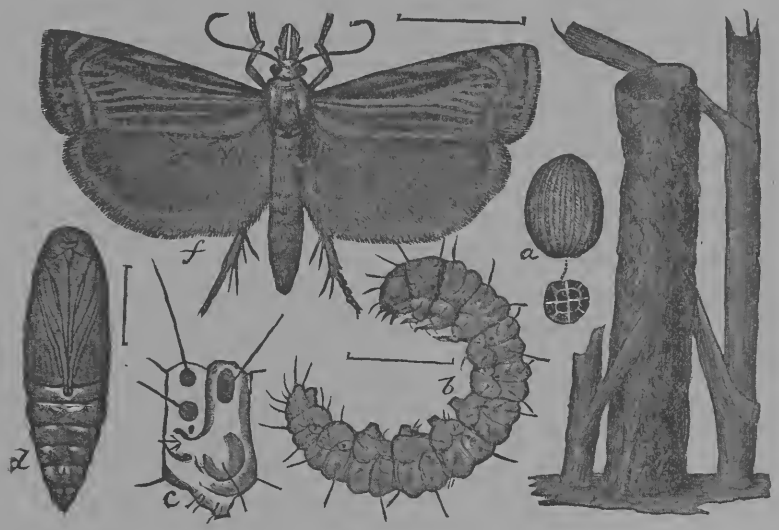


FIG. 1. — *Crambus hortuellus: a*, egg, with summit much enlarged; *b*, mature larva; *c*, one of the abdominal segments of larva; *d*, pupa; *e*, nest of young larvæ in grass; *f*, imago — all enlarged. — From "Insect Life."

of the interspaces between the ribs) in the middle of the egg is 0.04 mm., and whose height is scarcely 0.02 mm., the surface itself very delicately shagreened. On the dome of the summit the surface is broken into polygonal cells which are about 0.04 mm. in diameter below, and grow smaller toward the apex." (Fig. 1, *a*.) (Scudder.)

"*Larva, First Stage.* — Head diameter, 0.2 mm.; body diameter, 0.125 mm.; length, 0.99 mm. General color a smutty white; head a little darker than the rest of the body. Scattered hairs occur on the head; numerous small dark-colored tubercles occur on the body, each bearing at least one hair." (Felt.)

"*Larva, Last Stage.* — Head shining luteo-castaneous, the ocellar field, labrum and clypeus black. Body pallid fuliginous, the harder parts glistening; dorsal shield of first thoracic segment luteous, inconspicuous; surface covered with longer or shorter erect bristles, which are very fine, and taper to an exquisitely fine point; they are blackish at base, but beyond testaceous; the longer ones are nearly as long as the breadth of the body, and are situated in lateral and infrastigmatal series; the shorter ones are hardly as long as the segments, and are distributed on the sides of the body; there is also a series of intermediate in length and laterodorsal in position, situated in the middle of the larger anterior division of the segments, while the lateral series lies on the smaller posterior section; under surface and prolegs pallid, the claws luteous. Length, 15 mm." (Fig. 1, *b* and *c*.) (Scudder.)

"*Chrysalis.* — Nearly uniform, very pale honey yellow, more pallid beneath; the wings, excepting at base, with a very slight olivaceous tinge; all the thoracic and the first two abdominal segments, as well as the wings and legs, finely edged at the incisures with dark castaneous, darkest near the head; all the abdominal segments are bordered posteriorly, at least on the dorsal surface, with pale testaceous; lips of spiracles fuscous; cremaster blackish or blackish fuscous. Length, 7.75 mm.; breadth, 2.25 mm." (Fig. 1, *d*.) (Scudder.)

CRAMBUS PERLELLUS. (Plate III., fig. 14.)

Phalæna Perlellus Scop., Ent. Carn., p. 243, No. 620 (1763).
Tinea Argentella Fab., Syst. Ent., p. 658 (1775).
Tinea Perlella Wien. Verz., p. 134 (1776).
Tinea Perlella Knoch., Beitr., Vol. I., p. 68, Plate IV., fig. 6 (1781).
Tinea Perlella Goeze, Ent. Beitr., Vol. III., part 4, p. 142 (1783).
Tinea Perlella Schrank, Faun. Boic., Vol. II., p. 102 (1793).
Tinea Dealbella Thunb., Diss. Ent., Vol. VII., p. 84 (1794).
Tinea perlella Fab., Ent. Syst., Vol. III., part 2, p. 292 (1794).
Tinea argentella Fab., Ent. Syst., Vol. III., part 2, p. 296 (1794).
Crambus argenteus Fab., Ent. Syst., Suppl., p. 471 (1799).
Tinea Perlella Hüb., Tineæ, Plate VI., fig. 40 (1803).
Chilo Perlellus Zinck., Germ. Mag., Vol. II., p. 97 (1817).
Chilo Perlellus Treits., Schm. Eur., Vol. IX., part 1, p. 129 (1832).
Crambus argyreus Steph., Ill. Br. Ent. Haust., Vol. IV., p. 318 (1834).
Crambus Arbustorum Steph., Ill. Br. Ent. Haust., Vol. IV., p. 319 (1834).
Crambus argentellus Steph., Ill. Br. Ent. Haust., Vol. IV., p. 319 (1834).
Crambus perlellus Dup., Nat. Hist. Lep., Vol. X., p. 114, Plate CCLXXIV., fig. 2 (1836).
Crambus Perlellus H. S., Schm., Vol. IV, p. 66 (1849).
Crambus perlellus Zell., Stett. Ent. Zeit., Vol. X., p. 313 (1849).
Crambus perlellus Zell., Bresl. Zeit., Vol. III., p. 11 (1850).
Crambus Argentellus Wood, Ind. Ent., p. 215, No. 1488 (1854).
Crambus perlellus Staint., Man., Vol. II., p. 184 (1859).
Crambus perlellus Zell., Chil. et Cram., p. 49 (1863).
Crambus innotatellus Walk., Lep. Het., Vol. XXVII., p. 156 (1863).
Crambus inornatellus Walk., Lep. Het., Vol. XXVII., p. 157 (1863).
Crambus sericinellus Zell., Chil. et Cram., p. 49 (1863).
Crambus inornatellus Clem., Pr. Ent. Soc. Ph., Vol. II., p. 418 (1864).
Crambus Perlellus Hein., Schm., Vol. I., part 2, p. 143 (1865).
Crambus perlellus Praun, Tineidæ, Plate II, fig. 15 (1869).
Crambus sericinellus Grote, Can. Ent., Vol. XIII., p. 66 (1881).
Crambus innotatellus Felt, Grass-eating Ins, pp. 74, 87 (1894).
Crambus perlellus Meyr., Handb. Br. Ent., p. 393 (1895).

Expanse of wings, 20 mm. Palpi, head and thorax pure silvery white. Fore wings very lustrous, pure silvery white. Hind wings and abdomen white, with a slightly cinereous

tint, especially on the apical part of the wings. All the fringes white.

Habitat. — Nova Scotia, New Brunswick, Quebec, Ontario, Maine, New Hampshire, Massachusetts, New York, Ohio, Illinois, California. Food, grass.

"*Egg.* — Creamy white when first laid, gradually changing to a scarlet color before hatching. Form, elliptical oval; size, .45 mm. by .36 mm. The egg-shell has sixteen longitudinal ridges and numerous smaller transverse ridges.

"*Larva, First Stage.* — Head diameter, .19 mm.; body diameter, .15 mm.; length, 1.05 mm. Body a dull straw color, with irregular reddish blotches on the dorsum. Scattered light-colored hairs occur on the head and body." (Felt.)

Crambus turbatellus. (Plate III., fig. 13.)

Arequipa turbatella Walk., Lep. Het., Vol. XXVII., p. 196 (1863).
Crambus bipunctellus Zell., Chil. et Cram., p. 23 (1863).
Crambus bipunctellus Robs., Ann. Lyc. N. Y., Vol. IX., p. 313 (1870).
Crambus turbatellus Felt, Grass-eating Ins., p. 86 (1894).

Expanse of wings, 22–25 mm. Head, palpi, thorax and fore wings snow white, the last with the median stripe represented by one or two dark-brown dots at the end of the cell, and one or two similar ones below the outer fourth of the cell. The subterminal line consists of a row of dark-brown dots angulated beyond the end of the cell; a terminal row of seven black dots, the one nearest the apex elongated. Fringes white. Hind wings snow white, sometimes with a central pale fuscous shade. Fringes snow white.

Habitat. — Canada, New York, Pennsylvania, Ohio, Illinois. Food plants and early stages unknown.

Crambus elegans. (Plate IV., fig. 8.)

Crambus elegans Clem., Pr. Ph. Ac. Sci., p. 204 (1860).
Crambus terminellus Zell., Chil. et Cram., p. 27 (1863).
Crambus elegans Zell., Stett. Ent. Zeit., Vol. XXXIII., p. 473, Plate II., fig. 5 (1872).
Crambus elegans Zell., Beitr., p. 93 (1872).
Crambus elegans Zell., Exot. Mic., p. 45 (1877).
Crambus elegans Felt, Grass-eating Ins., pp. 74, 86 (1894).

Expanse of wings, 12–15 mm. Palpi white above, slightly fuscous on the outside; head and thorax white, fuscous on the sides. Fore wings white; base of costa streaked with bright brown with a brassy lustre; a patch of brown on the hind margin near the base, and a short curved streak near its middle, which forms with its opposite, when the wings are closed, a semicircular dorsal line, beyond which the wing is thickly dusted with brown; a broad brown band, very broad on the costa, where it encloses a small white spot and a nearly straight brown subterminal line resting on a silvery-white ground. A marginal row of fine black points on the silvery terminal space. Fringes metallic cinereous. Hind wings pale lustrous cinerous, with lighter fringes.

Habitat. — Ontario, Maine, Massachusetts, New York, New Jersey, Illinois, Ohio, Pennsylvania, Maryland, Texas. Food, grass.

"*Egg.* — Creamy white when first laid, gradually turning to an orange-buff color before hatching. Form, oval; size, .42 mm. by .30 mm. The egg-shell has sixteen longitudinal ridges and numerous smaller transverse ridges.

"*Larva, First Stage.* — Head diameter, .2 mm.; body diameter, .125 mm.; length, 1.09 mm. Head and thoracic shield light brown; body a dirty straw color. Scattered hairs occur on the head and body." (Felt.)

Crambus myellus. (Plate II., fig. 7.)

Phalæna Pinetella Scop., Ent. Carn., p. 244 (1763).
Tinea Conchella Wien. Verz., p. 134 (1776).
Tinea Pinetella Knoch., Beitr., Vol. I., Plate IV., fig. 5 (1781).
Tinea conchella Wien. Verz., Illig. ed., Vol. II., p. 83 (1801).
Tinea Myella Hüb., Tineæ, Plate VI., fig. 37 (1803).
Tinea Pinetella Schrank, Faun. Boic., Vol. II., p. 101 (1804).
Bombyx Pineti Esp., Suppl., p. 54, Plate LXXXIX, figs. 4, 5 (1807).
Chilo Conchellus Zinck., Germ. Mag., Vol. II., p. 74 (1817).
Catoptria Conchalis Hüb., Verz., p. 365 (1818).
Chilo conchellus Tr., Schm., Vol. IX, part 1, p. 97 (1832).
Crambus conchellus Dup., Nat. Hist. Lep., Vol. X., p. 91, Plate CCLXXI. (1836).
Crambus Myellus H. S, Schm., Vol. IV., p. 64 (1849).
Crambus Hercyniæ Hein., Bresl. Zeit., p. 3 (1854).
Crambus latiradiellus Walk., Lep. Het., Vol. XXVII., p. 157 (1863).
Crambus interruptus Grote, Can. Ent., Vol. IX., p. 101 (1877).
Crambus interruptus Grote, Can. Ent., Vol. XII., p. 15 (1880).
Crambus myellus Meyr., Handb. Br. Lep., p. 392 (1895).

Expanse of wings, 19–24 mm. Head white above; palpi white above and beneath, brown on the outside; thorax white above, brownish on the sides. Fore wings pale ferruginous, with a snow-white stripe extending through the middle of the wing from the base to near the outer border; this stripe and also the apical portion of the wing edged with dark ferruginous; two slightly curving, oblique, dark ferruginous bars cross the white stripe, one at the middle of the wing, the other very near the outer end of the stripe. A terminal row of black dots. Fringes dark smoky fuscous, cut by white in three or four places. Hind wings pale fuscous.

Habitat. — Nova Scotia, Maine, Europe. Early stages and food plant unknown.

CRAMBUS LUCTIFERELLUS LUCTUELLUS. (Plate II., fig. 8.)

Crambus luctuellus H. S., Schm., Vol. VI., p. 145, Plate III., fig. 21 (1852).

Expanse of wings, 20–22 mm. Head white above and in front; palpi white above and beneath, dark brown on the outside. Fore wings dark cinnamon brown, with a white stripe through the middle, extending from the base to near the outer margin, gradually widening outwardly, and interrupted by two broad, oblique, dark-brown bars, the inner one a little beyond the middle of the wing, the outer one very near the end of the white stripe, each curved on the sides toward each other. A terminal row of black dots. Fringes dark smoky brown, metallic. Hind wings fuscous.

Habitat. — Labrador, Washington, Europe. Early stages and food plant unknown.

CRAMBUS VULGIVAGELLUS. (Plate V., fig. 15.)

Crambus vulgivagellus Clem., Pr. Ph. Ac. Sci., p. 204 (1860).
Crambus aurifimbrialis Walk., Lep. Het., Vol. XXVII., p. 157 (1863).
Crambus chalybirostris Zell., Chil. et Cram., p. 40 (1863).
Crambus vulgivagellus Riley, Dept. Agr., 1881–82, pp. 179–183 (1881).
Crambus vulgivagellus Saund., Can. Ent., Vol. XIII., pp. 181, 199 (1881).
Crambus vulgivagellus Lintn., Rep. Ins. N. Y., Vol. I., p. 127 (1882).
Crambus vulgivagellus Fern., Stand. Nat. Hist., Vol. II., p. 276 (1885).
Crambus vulgivagellus Osborn, Ins. Life, Vol. VI., pp. 72, 78 (1893).
Crambus vulgivagellus Felt, Grass-eating Ins., pp. 69, 85 (1894).

Expanse of wings, 20–39 mm. Palpi very long, heavily scaled at the tip, luteous, dark fuscous on the outside; head and thorax luteous. Fore wings luteous or dull yellowish, with numerous fuscous streaks formed by atoms between the veins, and two in the cell. A terminal line of seven black dots. Fringes with a golden lustre. Hind wings fuscous; fringes long, pale yellowish. (Fig. 2, *d*.)

This is a very common insect, and the amount of damage done by the larvæ is very great, hundreds of acres of grass land sometimes being destroyed. The larva spins a delicate web among the roots of the grass, and gradually forms a tube in which it is entirely concealed. As it increases in size it extends the tube downward into the ground, and when the insect is full grown the tube is sometimes nearly two inches in length.



Fig. 2. — *Crambus vulgivagellus: a*, larva; *b*, the larval case in the grass; *c*, the cocoon in the ground; *d*, the moth, a dark specimen; *e*, wing of a light specimen; *f*, the moth at rest; *g*, the egg enlarged, its natural size shown beside it. — From the Department of Agriculture.

Habitat. — Nova Scotia, Ontario, Massachusetts, New York, New Jersey, Pennsylvania, North Carolina, Ohio, Illinois, Missouri, Texas, California, Vancouver Island. Food, grass, wheat, rye and other grains.

"*Egg.* — A pale straw color when first laid, gradually turning to an ochreous buff color before hatching. Form, elliptical oval; size, .45 mm. by .36 mm. The egg-shell has twenty longitudinal ridges and numerous smaller transverse ridges. (Fig. 2, *g*.)

"*Larva, First Stage.* — Head diameter, .19 mm.; body diameter, .175 mm.; length, 1.25 mm. Head a dark brown; thoracic shield olive, and the body a straw-yellow color. Scattered light-colored hairs occur on the head and on the numerous small brownish tubercles on the body.

"*Larva, Late in the Fall.* — Length, 2.5 mm. Head jet black; thoracic shield a deep brown; body brown, with deep-brown tubercles. The fifth to thirteenth segments inclusive are divided into cephalic and caudal portions by a short transverse constriction." (Fig. 2, *a*.) (Felt.)

"*Cocoon.* — Average length, .9 inch; diameter at the broadest part, .24 inch. The shape is subcylindrical, but varying from an almost uniform diameter to an enlargement of the lower portion to twice the diameter of the upper part." (Fig. 2, *c*.) (Lintner.)

"*Pupa.* — Average length, about .4 inch; average greatest diameter, .1 inch. Color, pale brown. Head case projected at the tip, and eye cases prominent. Tip of wing covers rounding over the segment, the inner wing cover showing its margin over more than three segments. The stigmata appear as minute tubercles. Anal tip dark brown, blunt, and slightly excavated beneath." (Lintner.)

Crambus biothanatalis. (Plate IV., fig. 1.)

Crambus biothanatalis Hulst, Tr. Am. Ent. Soc., Vol. XIII., p. 166 (1886).
Crambus behrensellus Fern., Ent. Am., Vol. III., p. 37 (1887).

Expanse of wings, 17–20 mm. Palpi, head and thorax ochre-yellow. Fore wings light ochreous, thickly sprinkled with fuscous; median space lighter, with two broken ochre cross-lines forming scallops on the costal half of the wing, each with a tooth inwardly below the middle. A terminal row of seven black points, resting on an ochre-yellow band. Fringes dull golden, with metallic lustre. Hind wings and abdomen fuscous.

Habitat. — California. Early stages and food plant unknown.

Crambus ruricolellus. (Plate II., fig. 14.)

Crambus ruricolellus Zell., Chil. et Cram., p. 40 (1863).
Crambus ruricolellus Felt, Grass-eating Ins., pp. 67, 84 (1894).

Expanse of wings, 18–20 mm. Palpi pale ochreous, tinged with fuscous on the outside; head and thorax pale

ochreous. Fore wings very pale ochreous, with orange-brown scales arranged in lines along the interspaces, more or less diffused on the costal half; a median line of orange-brown scales arising from the middle of the costa, extending out to the end of the cell, where it curves and runs in a nearly straight line to the basal third of the hind margin; a subterminal line, arising from the outer third of the costa, forms a semicircle to a point two-thirds across the wing, then runs nearly straight to the hind margin. Terminal line composed of a marginal row of brown dots. Fringes golden. Hind wings pale gray, darker outwardly; fringes lustrous white.

Habitat. — Ontario, Maine, New Hampshire, New York, Pennsylvania, Ohio, Illinois. Food, grass and sheep sorrel.

"*Egg.* — Creamy white when first laid, gradually turning to an orange-buff color before hatching. Form, elliptical oval; size, .41 mm. by .33 mm. The egg-shell has twenty longitudinal ridges and numerous smaller transverse ridges.

"*Larva, First Stage.* — Head diameter, .225 mm.; body diameter, .175 mm.; length, 1.2 mm. Head nearly black: thoracic shield a dark reddish brown; body whitish translucent, with many pale rufous spots on the dorsum of the fifth to the twelfth segments, inclusive. Scattered dark-colored hairs occur on the head and body. Late in the fall the head and thoracic shield are almost black, the pale rufous spots have developed into dark-brown tubercles, and the body has become deep brown." (Felt.)

Crambus anceps. (Plate II., fig. 10.)

Crambus anceps Grote, Can. Ent., Vol. XII., p. 17 (1880).

Expanse of wings, 18 mm. Head, palpi and thorax dark fuscous. Fore wings dark brownish fuscous, crossed by two dark, reddish-brown angulated lines, which seem to be formed of short parallel dashes located so as to form strong outward angles above the middle of the wing, then curving in for a short distance and running parallel to the outer margin. These lines are connected with each other by a

dark, reddish-brown stripe above and parallel to the fold. Median line fused with a dark outer discal spot. Fringes metallic fuscous. Hind wings fuscous, with traces of subterminal line.

Habitat. — California. Early stages and food plant unknown.

Crambus teterrellus. (Plate III., fig. 10.)

Chilo teterrellus Zinck., Germ. Mag., Vol. IV., p. 252 (1821).
Crambus camurellus Clem., Pr Ph. Ac. Sci., p. 203 (1860).
Crambus terrellus Zell., Chil. et Cram., p. 27 (1863).
Crambus teterrellus Murtf., Bull. U. S. Dep. Agr., No. 30, p. 53 (1893).
Crambus teterrellus Felt, Grass-eating Ins., pp 66, 84 (1894).

Expanse of wings, 15–21 mm. Palpi fuscous, whitish above; head whitish; thorax whitish above, reddish fuscous on the scapulæ. Fore wings pale ochreous, dusted with fuscous, with an irregular fuscous patch on the outer part of the cell and in the submedian space, extended more or less toward the base of the wing; a faint brown median line, arising from the costa a little beyond the middle, forms an outward angle at the end of the cell and another on the median space, then terminates at the middle of the hind margin: the subterminal line forms an obtuse angle a little above the middle of the wing, edged outwardly by a faint silvery line. A terminal row of black points. Fringes dark, but with a silvery hue. Hind wings light gray; fringes lighter.

Habitat. — Maine, New York, Pennsylvania, Ohio, North Carolina, Georgia, Florida, Alabama, Missouri, Texas. Food, grass.

"*Egg.* — Obconical, .5 mm. long, beautifully sculptured, under the lens, with longitudinal ridges and finer cross-lines, giving it a checkered appearance. Color, bright salmon pink.

"*Larva.* — At first of a dingy cream white, minutely sprinkled with brown, with brown head. At maturity 15 mm. in length by 2 mm. in diameter, subcylindrical, slightly larger across the thoracic segments. Color yellowish or greenish white, with dull-green medio-dorsal stripe.

The surface is much roughened with impressed lines, with conspicuous raised corneous plates, from each of which arises a long, coarse, tapering, yellow-golden hair. Head with protruding lobes and rugose surface, and of a dull whity-brown color. Cervical shield inconspicuous, darker than the head." (Miss Murtfeldt.)

Crambus decorellus. (Plate I., fig. 15.)

Chilo decorellus Zinck., Germ. Mag., Vol. IV., p. 250 (1821).
Crambus polyactinellus Zell., Chil. et Cram., p. 25 (1863).
Crambus decorellus Zell., Beitr , Vol. I., p. 92 (1872).
Crambus Goodellianus Grote, Can. Ent., Vol. XII., p. 17 (1880).
Crambus bonusculalis Hulst, Tr. Am. Ent. Soc., Vol. XIII., p. 167 (1886).
Crambus decorellus Fern., Ent. Am., Vol. IV., p. 44 (1888).
Crambus decorellus Felt, Grass-eating Ins., p. 84 (1894).

Expanse of wings, 19 mm. Palpi, head, thorax and abdomen very pale ochreous. Fore wings pale ochreous, with the veins shaded with fuscous; two dark ochre cross-lines, the median at the outer edge of the cell bent at its first third, and an outward tooth at its second; subterminal line edged on the outer side with fuscous; marginal band ochre-yellow, enclosing a row of black dots. Fringe metallic, black at base, iridescent golden outwardly. Hind wings white or ochreous, tinged with golden outwardly.

Habitat. — Massachusetts, Maryland, Pennsylvania, Georgia, Texas. Early stages and food plant unknown.

Crambus coloradellus. (Plate III., fig. 8.)

Crambus coloradellus Fern., Can. Ent., Vol. XXV., p. 95 (1893).

Expanse of wings, 22 mm. Head, palpi, thorax and fore wings pale silvery straw color; palpi darker on the outside. A white stripe extends from the base of the wing through the cell to the outer margin, bifid beyond the cell. All the veins more or less indicated by pale yellow, edged on each side with a more or less broken row of black scales. A pale-yellow median line crosses the wing at the end of the

cell, where it rounds outwardly and runs nearly straight and vertical to the hind margin. Subterminal line curved within the apex, then running to the hind margin. Both of these lines are faint, and the subterminal is edged on the outside with silvery scales. Terminal row of black dots in a straight line, not following the margin at the lower part, where it rounds outwardly. Fringes silvery metallic. Hind wings white, slightly stained with pale fuscous on the apex.

Habitat. — Colorado. Early stages and food plant unknown.

Crambus bolterellus. (Plate II., fig. 15.)

Crambus bolterellus Fern., Ent. Am., Vol. III., p. 37 (1887).

Expanse of wings, 22 mm. Palpi, head and thorax pale ochre-yellow, the palpi touched with fuscous on the outer side; patagiæ overlaid with lead-colored scales. Fore wings white, broadly edged with fuscous on the costa; behind this edging a dull-colored stripe extending from the basal fourth of the cell to the apex, the remaining intervenular spaces of the same color. An oblique reddish-brown line crosses the wing a little beyond the end of the cell, with a slight inward angle near vein 2 and a strong outward angle beyond the end of the cell. A second line crosses the wing rather more than half way between the other and the outer margin, of the same color and similarly angulated below the costa, but following the outline of the outer margin below the angle. A row of six or seven black points on the intervenular spaces, at the end of the wing. Fringes pale silvery metallic. Hind wings dull white, with a pale fuscous terminal line not reaching the anal angle. Fringes white.

Habitat. — Texas. Early stages and food plant unknown.

Crambus hulstellus. (Plate III., fig. 3.)

Crambus hulstellus Fern., Can. Ent., Vol. I., p. 56 (1885).
Crambus hulstellus Felt, Grass-eating Ins., p. 83 (1894).

Expanse of wings, 26 mm. Head, thorax and fore wings chalky white; palpi somewhat fuscous on the outside, remainder of the surface white. Fore wings crossed by a twice

angulated brown median line, much darker and heavier on the angles, starting from a point a little below the costa and extending a little beyond the end of the cell, where the first acute angle is formed. The line then runs obliquely across the wing to the middle of the hind margin, forming the second angle just below the cell, where it becomes nearly obsolete. A double yellowish line, starting from the costa near the outer fourth and curving downward, runs nearly parallel with the outer margin to the hind margin, just within the anal angle. Terminal space yellowish, fusing with the line so that it appears double only at the costa; a row of seven black points along the outer margin. Six geminate brown dashes between the median and subterminal lines; three dark-brown elongated patches between the base and the median line. Fringes white, with the base silvery. Hind wings sordid white, with a slightly darker terminal border. Fringes pure white.

Habitat.—Texas. Early stages and food plants unknown.

Crambus attenuatus. (Plate III., fig. 4.)

Crambus attenuatus Grote, Can. Ent,, Vol. XII., p. 18 (1880).
Crambus attenuatus Grote, Can. Ent., Vol. XIII., p. 78 (1881).

Expanse of wings, 25 mm. Palpi, head and thorax white, thickly sprinkled with fuscous. Fore wings narrow, pale cinereous sprinkled with fuscous; a poorly defined, dull-whitish stripe, crossed beyond the cell by an oblique brown line, sometimes indistinct, extends from the base to the outer margin. Subterminal line whitish, bordered on each side with fuscous, running very obliquely from the costa to below the apex, then, more indistinctly marked, very closely following the terminal line. A row of brown dots in the terminal space. Fringes cinereous, with the base fuscous, and the outer edge with metallic lustre. Hind wings fuscous; fringes white.

Habitat. — California, Columbia, Vancouver Island. Early stages and food plant unknown.

Crambus albilineëllus. (Plate II., fig. 5.)

Crambus albilineëllus Fern., Can. Ent., Vol. XXV., p. 94 (1893).

Expanse of wings, 26 mm. Head, palpi, thorax and fore wings dull ochre-yellow. The palpi are darker on the outside, and the subcostal, median and veins 5 to 10 are white. A stripe of lead-colored scales extends from the base of the wing just above and parallel to vein 1 to the outer cross-line, and a similar stripe occurs between this and the hind margin. Two lines cross the wing; the median, dark brown, and arising from a point a little beyond the middle of the costa, forms an outward angle very near the costa and an inward angle on the subcostal vein; then a second outward angle, formed at the end of the median vein; and from this point the line runs more or less distinctly across to the middle of the hind margin. The subterminal line, dark brown, finer, dentate, and edged on the outside with lead-colored scales, runs from the costa before the apex across to near the outer margin, thence across the wing nearly parallel with the outer margin. The space from the end of the cell to the apex somewhat stained with brown. Terminal line fine, black, and with a row of black dots. Fringes concolorous with the adjacent part of the wing, but with slight metallic reflections. Hind wings fuscous, fringes lighter.

Habitat. — Southern California. Early stages and food plant unknown.

Crambus haytiellus.

Chilo Haytiellus Zinck., Germ. Mag., Vol. IV., p. 254 (1821).

Expanse of wing, 10–20 mm. Head and thorax pale ochreous yellow; palpi fuscous on the outside. Fore wings pale ochreous, with a whitish stripe from the base through the cell, and breaking up into lines on the veins outwardly. Costal portion fuscous, quite dark in some specimens. Median line represented by two or three dark-brown dots, one at the end of the cell, one on the fold and one below the fold, the three forming a nearly straight line from the end

of the cell to the basal third of the hind margin. The subterminal line, brown, edged on the outside with silvery scales, slightly serrate, forms a curve below the costa and gives off a tooth on the fold. A terminal row of black dots. Fringes silvery gray. Hind wings pale fuscous.

Habitat. — Texas, Hayti. Early stages and food plant unknown.

Crambus trichostomus. (Plate II., fig. 6.)

Crambus trichostomus Chris., Stett. Ent. Zeit., Vol. XIX., p. 313 (1858).
Crambus trichostomus Möschl., Wien. Monats., p. 379 (1860).
Crambus trichostomus Zell., Chil. et Cram., p. 28 (1863).
Crambus trichostomus Pack., Pr. Bos. Soc. Nat. Hist., Vol. XI., p. 55 (1868).

Expanse of wings, 20 mm. Head and thorax dark brown, intermingled with gray scales; palpi very hairy, dark brown, with some gray hairs above. Fore wings dark brown, with a whitish stripe from the middle of the base out to an oblique dark-brown cross stripe on the basal third; this stripe followed by a broad median white shade, extending nearly to the broad white subterminal line; this line commences on the costa a little within the apex, and, curving inward, forms an outward angle near vein 5, thence runs parallel with the outer margin to the fold, where it curves out and terminates near the anal angle. Terminal line dark brown. Lower two-thirds of the terminal space overlaid more or less with white scales. The dark portions of the wing streaked longitudinally with light and dark brown. Fringes dark fuscous. Hind wings dark fuscous; fringes paler.

Habitat. — Labrador. Early stages and food plant unknown.

Crambus oregonicus. (Plate III., fig. 9.)

Crambus oregonicus Grote, Can. Ent., Vol. XII., p. 17 (1880).
Crambus oregonicus Grote, N. Am. Ent., p. 68, Plate V., fig. 9 (1880).

Expanse of wings, 17 mm. Head and thorax white above, brown on the sides. Fore wings light ochreous brown, with a longitudinal diffuse white stripe extending across the

median space; a dark-brown, acutely dentate median line, of which sometimes only a brown dash on the median space and another at the extremity of the disk are visible. Subterminal line brown, edged with white outwardly. A white apical patch, and more or less white on the hind margin. Fringes brownish. Hind wings pale fuscous, with narrow terminal line and white fringes.

Habitat. — Oregon. Food plant and early stages unknown.

CRAMBUS BONIFATELLUS. (Plate VI., fig. 6.)

Spermatophthora? bonifatellus Hulst, Ent. Am., Vol. III., p. 135 (1887).

Expanse of wings, 21 mm. Head, palpi and thorax light fuscous. Fore wings yellowish fuscous, with the veins lighter; a whitish dot with a black dentate spot on each side of it near the end of the cell; an indistinct row of dark marginal points. Fringes ochreous. Hind wings smoky fuscous.

Habitat. — Colorado. Early stages and food plant unknown.

CRAMBUS MUTABILIS. (Plate II., fig. 9.)

Crambus mutabilis Clem., Pr. Ph. Ac. Sci., p. 204 (1860).
Crambus fuscicostellus Zell., Chil. et Cram., p. 44 (1863).
Crambus mutabilis Felt, Grass-eating Ins., pp. 64, 83 (1894).

Expanse of wings, 23–24 mm. Palpi, head and thorax fuscous. Fore wings grayish fuscous, luteous on the posterior half; a diffuse grayish median stripe, tinted with luteous, spreading over the costal half of the wing, with the exception of a brown costal margin from the base half way to the apex; a dark-brown dot at the end of the median vein, sometimes streaked with dark fuscous below the vein. Subterminal line dark brown, faint, dentate, usually with a marginal row of brownish dots. A diffuse brown streak from the apex inward toward the cell. Fringes brownish, lustrous. Hind wings gray or pale fuscous; fringes pale fuscous.

Habitat. — Ontario, Massachusetts, Connecticut, New York, Ohio, Illinois, Kentucky, Florida, Louisiana, Nebraska, Texas. Food, grass.

"*Egg.* — Creamy white when first laid, gradually turning to an orange-rufous color before hatching. Form, elliptical oval; size, .51 mm. by .36 mm. The egg-shell has sixteen longitudinal ridges and numerous small transverse ridges.

"*Larva, First Stage.* — Head diameter, .18 mm.; body diameter, .15 mm.; length, 1.1 mm. Head pale yellowish, with a sprinkling of sooty specks; body a rather sooty, semi-transparent white, with irregular rufous blotches along the dorsum; scattered dark-colored hairs occur on the head and body." (Felt.)

Crambus hemiochrellus. (Plate II., fig. 13.)

Crambus hemiochrellus Zell., Ex. Mic., p. 49 (1877).

Expanse of wings, 22 mm. Head and thorax pale ochre-yellow; palpi thickly sprinkled with gray atoms. Fore wings bright ochreous yellow between the white median vein and hind margin, with dusty stripes, and usually a clear yellow stripe along the fold. Costal portion of the wing yellowish gray, darker towards the base. Median line fine, rust brown, forming an acute angle at the end of the cell, and extending in a nearly straight line to the middle of the hind margin. Subterminal line fine, dark brown, dentate on the veins and parallel with the outer margin except at the costal end, where it curves sharply inward and terminates at the outer fourth of the costa. Terminal space dusty gray. Terminal line rather indistinct, upon which, in some specimens, may be seen seven very fine dark-gray dots. Fringes light gray. Hind wings light gray; fringes lighter.

Habitat. — Texas. Early stages and food plant unknown.

Crambus undatus. (Plate III., fig. 12.)

Crambus undatus Grote, Can. Ent., Vol. XIII., fig. 35 (1881).

Expanse of wings, 21 mm. Palpi, head and thorax cinereous or pale grayish, dusted with fuscous. Fore wings narrow, acute, whitish gray, sprinkled with fuscous scales, especially on the basal and costal portions; two distinct, jagged, fuscous brown lines, strongly angulated above the

middle of the wing, the median quite irregular below the cell. A fine dark terminal line. Fringes pale, with metallic lustre. Hind wings pale grayish.

Habitat. — California. Early stages and food plant unknown.

CRAMBUS TRISECTUS. (Plate III., fig. 11.)

Carvanca trisecta Walk., Lep. Het., Vol. IX., p. 119 (1856).
Crambus exsiccatus Zell., Chil. et Cram., p. 37 (1863).
Crambus interminellus Walk., Lep. Het., Vol. XXVII., p. 156 (1863).
Crambus bilitarellus Zell., Lep. Westk. Am., p. 7 (1874).
Crambus exsiccatus Grote, Can. Ent., Vol. XII., p. 78 (1880).
Crambus exsiccatus Lintn., Rep. Ins. N. Y., Vol. I., pp. 149–151 (1882).
Crambus exsiccatus Osborn, Dept. Agr., pp. 154-160 (1887).
Crambus exsiccatus Osborn, Bull. U. S. Dept. Agr., No. 30, p. 44 (1893).
Crambus exsiccatus Osborn, Ins. Life, Vol. VI., pp. 72, 78 (1893).
Crambus interminellus Felt, Grass-eating Ins., pp. 62, 83 (1894).

Expanse of wings, 23–32 mm. Palpi whitish, mixed with fuscous scales on the outside; head whitish; thorax very light ochreous. Fore wings very pale ochreous, lighter below the fold and on the outer part; surface sprinkled with dark brown; interspaces beyond the cell marked with whitish lines; a dark-brown spot near the base of vein 2, and a short, dark-brown, oblique, dentate line about half way between this and the end of the wing. Terminal line represented by three or four dark-brown dots. Fringes steel gray, cut by four or five white lines. Hind wings pale grayish white, lighter towards the base; fringes whitish.

Habitat. — Nova Scotia, Ontario, Maine, New Hampshire, Massachusetts, New York, District of Columbia, Illinois, Iowa, Nebraska, Colorado, Missouri, Vancouver Island. Food, grass.

"*Egg.* — A cream-yellow color when first laid, gradually turning to an orange-buff color before hatching. Form nearly elliptical; size, .48 by .33 mm. The egg-shell has sixteen strong longitudinal ridges and numerous smaller transverse ridges.

"*Larva, First Stage.* — Head diameter, .225 mm.; body diameter, .15 mm.; length, 1.2 mm. Head black, thoracic shield a dark brown; body a translucent white, with numerous small black tubercles, each tubercle bearing one or more light-colored hairs. Scattered light-colored hairs occur on the head. When about half grown (late fall) the larva is 2 cm. long. The head and tubercles are black, while the body is a mottled chocolate brown, with a black stripe extending along the dorsal line. Early in the spring the larva is about 3 cm. long. The head and thoracic shield are of a dark umber color; tubercles of the same color; there is a dull pinkish line along the middle of the back; there are also irregular dark wavy subdorsal and lateral lines; body a pale straw color.

"*Pupa.* — Thorax and head brown; abdomen rufous; spiracles dark brown; length about 2 cm.

"*Cocoon.* — Oval, composed of a thick layer of bits of grass, with particles of soil adhering to the outside. Inside, the cocoon is smooth and thinly lined with silk. The cocoon was made just below the surface." (Felt.)

Crambus laciniellus. (Plate IV., fig. 7.)

Crambus laciniellus Grote, Can. Ent., Vol. XII., p. 18 (1880).

Expanse of wings, 26–28 mm. Palpi pale cinereous, brownish outwardly; head and thorax cinereous. Fore wings pale cinereous ochreous, especially on the costal and outer portions of the wing; a few brown atoms sprinkled over the surface; subterminal line indistinctly marked by ochre scales partially overlaid with brown. A marginal row of three black points above the anal angle. Fringes shining fuscous, with a whitish line at the base. Hind wings pale cinereous, fringes white.

Habitat. — Maine. Food plant and early stages unknown.

CRAMBUS DIMIDIATELLUS. (Plate IV., fig. 13.)

Crambus dimidiatellus Grote, Ann. Mag. Nat. Hist., Series V., Vol. II., p. 57 (1883).

Expanse of wings, 35 mm. Palpi ochreous, sprinkled with fuscous atoms; head and thorax pale ochreous. Fore wings with a costal band reaching to the middle of the cell, and curving up toward the apex, ashy brown, inclining to olivaceous. A white stripe extends from the base two-thirds the length of the wing, where it breaks up more or less into venular lines reaching to the outer margin. Hind margin broadly shaded with very pale ashy brown. A marginal row of black points, scarcely visible. Fringes pale ash colored. Hind wings pale silky fuscous; fringes lighter.

Habitat. — Colorado and New Mexico. Food plant and early stages unknown.

CRAMBUS CALIGINOSELLUS. (Plate IV., figs. 2, 3.)

Crambus caliginosellus Clem., Pr. Ph. Ac. Sci., p. 204 (1860).
Crambus caliginosellus Felt, Grass-eating Ins., pp. 61, 83 (1894).

Expanse of wings, 13–25. Head, palpi and thorax dark fuscous, sprinkled with gray scales. Fore wings dark fuscous, sprinkled with brown or yellowish, and frequently with a few gray scales; median line dark brown, often edged with white, arising a little beyond the middle of the costa, extending outward, forming a very acute angle, thence backward across the end of the cell to the hind margin, a little beyond the middle, and giving off an outward angle on the fold. Subterminal line dark brown, edged outwardly with dark lead-colored scales, and frequently dentate along the first part of its course. It arises from the costa about half way between the median line and the apex, extending down to a point beyond the end of the cell, where it forms an outward angle, thence to the hind margin, a little within the anal angle, giving off an inward angle on the fold. This angle is frequently connected along the fold with the outward angle of the median line; terminal line dark brown, rather indistinct. The lines are often obliterated more or less, especially the median. Fringes dark leaden gray. Hind wings dark fuscous; fringes a little lighter.

Habitat. — Ontario, Massachusetts, New York, Pennsylvania, Delaware, District of Columbia, North Carolina, Illinois, Texas. Food, grass, corn.

"*Egg.* — Creamy white when first laid, gradually turning to an orange-rufous color before hatching. Form elliptical oval, with the ends slightly truncate; size, .39 mm. by .3 mm. The egg-shell has eighteen longitudinal ridges and numerous smaller transverse ridges.

"*Larva, First Stage.* — Head diameter, .15 mm.; body diameter, .125 mm.; length, .875 mm. Color a smutty, translucent white, with irregular reddish spots on the middle line of the back; head a pale amber color. Scattered light-colored hairs occur on the head and body. Five pairs of prolegs occur on the seventh to the tenth inclusive and thirteenth segments." (Felt.)

"The full-grown larva is about one inch in length, of a slender, cylindrical form, and of a pinkish-white color, slightly tinged with brown. The head is dark brown or black. There are several stiff bristles or hairs upon each segment.

"This *Crambid* works upon the centre portion of the plant, just beneath the surface of the soil. It spins silken galleries which extend from the plant several inches just beneath the surface of the soil. Some plants were nearly girdled, and the larvæ were frequently found imbedded in cavities where they had fed upon the plants. In some instances as many as thirty larvæ were found in a single hill of corn, and in many hills the plants had been entirely destroyed." (Beckwith.)

Crambus zeëllus. (Plate IV., fig. 4.)

Crambus zeëllus Fern., Can. Ent., Vol. XVII., p. 55 (1885).
Crambus zeëllus Forbes, Rep. Ins. Ill., Vol. XIV., pp. 14, 15, Plate I., figs. 1, 2, 3 (1885).
Crambus refotalis Hulst, Tr. Am. Ent. Soc., Vol. XIII., p. 166 (1886).
Crambus refotalis Fern., Ent. Am., Vol. III., p. 22 (1887).

Expanse of wings, 18–24 mm. Palpi, head and thorax pale leaden gray. Fore wings dull leaden gray, mixed with ashy and whitish, especially on the outer part, and crossed

beyond the middle by two angulated, dull ochre-yellow lines, overlaid more or less with dark brown. The first or median line crosses the end of the cell, where it is angulated. The second or subterminal, crosses the wing about half way between this last and the end. Terminal line dark brown, and a dark brownish cloud extends obliquely in from the apex to the subterminal line, but does not reach the costa. A narrow, ochre-yellow line, somewhat curved, extends from the middle of the base of the wing to the subterminal line near the anal angle, and a similar line, though less plainly marked, runs parallel between this line and the hind margin. Terminal space more or less gray. The outer margin regularly excavated below the apex. Fringes pale metallic lead color. Hind wings pale fuscous, with lighter fringes.

Habitat. — Maine, Pennsylvania, West Virginia, Illinois, Missouri. Food, corn.

The following descriptions of the larva and pupa are compiled from those published by Prof. S. A. Forbes in the "Fourteenth Report of Noxious and Beneficial Insects of Illinois," pp. 14, 15, 1895: —

Larva. — Head dark chocolate brown, slightly and irregularly rugose, with long yellowish hairs; upon the front a white S-shaped mark; cervical shield yellowish, with a white median line; anterior edge whitish, and an oval black spot on the sides. Below the lateral edges of the cervical shield are two hairy tubercles; second and third segments of thorax each with two rows of hairy tubercles, the anterior of four, the posterior of two large quadrate spaces, sometimes united in the middle. From the fourth to the tenth segment the hairy tubercles above the spiracles are in two transverse rows of four each, those of the anterior row being quadrate with rounded angles, and as large as the interspaces; those of the posterior row transversely elongated, about twice as long as wide. Lateral tubercle of anterior row immediately above the spiracle emarginate at its posterior inferior angle, on all the segments from the sixth to the ninth; on these segments a smaller tubercle behind and beneath the spiracle, and two others between the spiracle and the proleg; a narrow arcuate tubercle, with long hairs outside, in

front of each proleg. Anal shield smooth, reddish brown, with a few long brown hairs; spiracles dark brown. Ventral surface paler than the dorsal. Length of full-grown larva, .6 to .8 of an inch; greatest width, .1 inch.

Pupa. — Pupa smooth, shining, pale brown; abdomen a little darker, without hairs or spines; abdomen with an obtuse horny tip. Length, .4 inch; width, .1 inch.

Crambus luteolellus. (Plate IV., fig. 5.)

Crambus luteolellus Clem., Pr. Ph. Ac. Sci., p. 203 (1860).
Crambus duplicatus Grote, Can. Ent., Vol. XII., p. 79 (1880).
Crambus luteolellus Felt, Grass-eating Ins., pp. 61, 82 (1894).
Crambus holochrellus Zell. (Manuscript name?)

Expanse of wings, 20–26 mm. Palpi pale yellowish, dusted externally with fuscous; head and thorax ochreous yellow. Fore wings ochre-yellow, dusted more or less with ashy scales, especially outwardly; median line rather broad, yellow, very indistinct, running from the end of the cell to near the middle of the hind margin; subterminal line nearly parallel with the median, forming an outward tooth on the fold; both lines often obliterated. Terminal line very indistinct, sometimes consisting of only a row of points. Fringes concolorous with the end of wing. Hind wings fuscous; fringes much lighter.

This species is very perplexing because of its variability; some specimens before me are clear ochre-yellow, without markings of any kind, and there is every gradation between this and those with the median and subterminal lines well marked. The outer margin also varies more or less in form from straight to emarginate.

Habitat. — Ontario, Maine, New York, North Carolina, Illinois, Missouri, Colorado, Arizona, California. Food, grass.

"*Egg.* — A light rufous color when first laid. Form elliptical oval; size, .42 by .3 mm. There are about fourteen prominent longitudinal ribs and numerous smaller transverse ridges." (Felt.)

CRAMBUS LUTEOLELLUS ULÆ. (Plate IV., fig. 6.)

Crambus ulæ Ckll., Ent. Mon. Mag., Vol. XXIV., p. 272 (1888).
Crambus ulæ Fern., Ent. Am., Vol. IV., p. 44 (1888).

Expanse of wings, 24 mm. This variety differs from the description above only in being a little more ashy beyond the cell. This species is so exceedingly variable that at first I was not disposed to consider this insect (the type of which Mr. Cockerell very kindly gave me) even as a variety. I have before me another specimen, from Arizona, almost identical with Mr. Cockerell's type, and another from Colorado, which is intermediate between this type and some of the eastern forms of *luteolellus*. I am now inclined to think that it may be well to consider *ulæ* a geographical variety of *luteolellus*, but perhaps more material and further study may lead me to modify even this opinion.

Habitat. — Colorado, Arizona. Early stages and food plant unknown.

I saw the type of *Crambus innotatellus* Walk. in the British Museum, but could not study the structure of it. I think it may prove to belong to the genus Chilo.

THAUMATOPSIS MORRISON.

Face rounded; eyes large, hemispherical; ocelli present; antennæ scarcely more than half as long as the costa, pectinate or bipectinate in the male; labial palpi porrect, about as long as head and thorax; maxillary palpi about as long as the head, and triangularly scaled; tongue short; thorax smooth; abdomen in the male with a small anal tuft. Fore wings with twelve veins, 7, 8 and 9 from one stalk, all the rest separate; cell closed. Hind wings with eight veins, 4 and 5 arise near each other or from one point; cell open. Mr. Morrison redescribed *pexellus* Zell., and established the genus *Thaumatopsis* for it. In 1894 Mr. Grote established the genus *Propexus*, with *edonis* as the type; but, as *pexellus* and *edonis* are congeneric, we have adopted the older generic name.

SYNOPSIS OF THE SPECIES.

1. { Expanse of wings less than one inch, ... 2.
 { Expanse of wings more than one inch, ... 3.
2. { Fore wings dark brown, ... *striatellus.*
 { Fore wings yellowish brown, ... *pectinifer.*
3. { Median vein white, ... 4.
 { Median vein not white, ... 5.
4. { A dark-brown streak in the outer part of the cell, . . *pexellus.*
 { Fore wings without dark streaks, ... *magnificus.*
5. { Fore wings pale salmon pink, ... *edonis.*
 { Fore wings white, with numerous fine dark longitudinal lines, ... *repandus.*

THAUMATOPSIS MAGNIFICUS. (Plate IV., fig. 11.)

Propexus magnificus Fern., Can. Ent., Vol. 23, p. 30 (1891).

Expanse of wings, 40 mm. Palpi clothed with pale fawn-colored and black scales mixed; head and thorax pale fawn colored, the latter with a dorsal whitish stripe and the inner edge of the scapulæ also white. Fore wings pale fawn colored, and mixed more or less with darker scales, except on the costal region and along the fold. The costa and hind border narrowly edged with white, and the veins striped with white, the median stripe being much the widest; all are more or less expanded on the outer border. Fringes white, and cut by two parallel lines of pale fawn color. Hind wings and abdomen very pale fuscous. Fringes white.

Habitat. — Colorado. Food plants and early stages unknown.

THAUMATOPSIS PEXELLUS. (Plate IV., fig. 14.)

Crambus pexellus Zell., Chil. et Cram., p. 48 (male) (1863).
Crambus macropterellus Zell., Chil. et Cram , p. 48 (female) (1863).
Thaumatopsis longipalpus Mor., Pro. Bos. Soc. N. H., Vol. XVII., p. 165 (1874).

Expanse of wings, 32 mm. Head, palpi and thorax dull ochre-yellow, intermingled more or less with gray; labial

palpi longer than the head and thorax; antennæ in the male bipectinate; fore wings with the median vein white, and bordered above with dark brown in the outer half of the cell, from which a gray shade extends to the apex, behind which the entire surface of the wings is yellowish gray, except in the fold. Fringes yellowish gray. Hind wings grayish fuscous, paler basally.

Habitat. — Georgia, Missouri, Colorado. Food plant and early stages unknown.

I have seen Zeller's type, now in the British Museum; and Morrison's type, which belongs to the National Museum, is now before me.

Thaumatopsis edonis. (Plate IV., fig. 12.)

Crambus (*Propexus*) *edonis* Grote, Can. Ent., Vol. XII., p. 19 (1880).

Expanse of wings, 34–36 mm. Head, palpi and thorax reddish fuscous; antennæ of the male bipectinate; fore wings reddish fuscous, without markings, but dusted with fuscous on the interspaces and terminally. Fringes fuscous. Hind wings pale fuscous, with paler fringes.

Habitat. — North Carolina, Kansas. Food plants and early stages unknown.

Thaumatopsis repandus. (Plate IV., fig. 15.)

Crambus (*Propexus*) *repandus* Grote, Can. Ent., Vol. XII., p. 19 (1880).

Expanse of wings, 22–32 mm. Head, palpi and thorax whitish, more or less tinged with ashy gray. Fore wings whitish, with numerous fine dark-brown lines in the interspaces; median line broken and acutely angled at the end of the cell. Subterminal line black where it arises from the outer fourth of the costa, but soon changes to brown, forming an inward tooth on vein 7 and an outward tooth near the anal angle. Terminal line black, and broken into three dots between veins 3 and 5. Fringes silvery gray, cut with white three or four times. Hind wings pale yellowish, with white fringes and an indistinct subterminal line.

Habitat. — Texas, Arizona, Kansas, Colorado. Food plant and early stages unknown.

THAUMATOPSIS STRIATELLUS n. sp. (Plate IV., fig. 10.)

Expanse of wings, 22 mm. Head, palpi and thorax dark brown; antennæ dark brown, unipectinate. Fore wings umber brown, striped along the interspaces with dark brown. A white stripe extends from the base of the wing along the cell, near the middle of which it is broken up by a mass of dark-brown scales. Median line wanting. Subterminal line indicated by a curved line of white dots, bordered with dark brown, which extend from the outer third of the hind margin to vein 6. Terminal dark-brown dots scarcely visible. Fringes concolorous with the wing. Hind wings and abdomen slightly darker than the fore wings. Fringes a little lighter.

Habitat. — North Illinios. Described from one male specimen received from Mr. A. Bolter. Food plants and early stages unknown.

THAUMATOPSIS PECTINIFER. (Plate IV., fig. 9.)

Crambus pectinifer Zell., Exot. Mic., p. 51, Plate I., figs. 20 *a*, *b* (1877).

Expanse of wings, 19 mm. Head, palpi and thorax pale yellowish brown, sprinkled more or less with darker scales. Fore wings pale yellowish brown, darkest along the costa. A white stripe extends from the base of the wing over the cell, beyond which it breaks up into fine lines. Median line indicated by three small white spots edged with brown, in an oblique line from the end of the cell to the basal third of the hind margin. Subterminal line white, edged with brown, nearly parallel with the outer margin, and visible only below vein 5. Fringes gray, interlined with white. Hind wings pale fuscous, with lighter fringes.

Habitat. — Texas. Food plants and early stages unknown.

EUCHROMIUS GUEN.

Head medium; face with a slight cone-shaped projection; eyes hemispherical; ocelli present; antennæ about two-thirds as long as the costa, ciliate in the male, simple in the

female; labial palpi porrect, about twice as long as the head; maxillary palpi about half as long as the labial palpi; tongue well developed, scaled at the base; thorax smooth; abdomen with a medium anal tuft; legs of medium length, the inner spurs half as long as the outer.

Fore wings nearly three times as long as wide, the outer margin entire and rounded, with twelve veins all separate except 8 and 9, which are from one stalk; cell closed. Hind wings with eight veins, 4 and 5 from a stalk; cell open.

EUCHROMIUS OCELLEUS. (Plate V., figs. 13, 14.)

Palparia ocellea Haw., Lep. Brit., p. 486 (1811).
Crambus Cyrilli Costa, Dizion. Univ. di Agric. (1829).
Phycis funiculella Tr., Schmett. Eur., Vol. IX., p. 200 (1832).
Araxes ocellea Steph., Ill. Br. Ent. Haust., Vol. IV., p. 316 (1834).
Phycis cirillella Costa, Faun. Napol. Phycid., p. 2, Plate V., fig. 2 (1836).
Crambus funiculellus Zell., Isis, p. 175 (1839).
Crambus funiculellus Dup., Catalogue, p. 319 (1844).
Crambus Cyrilli Zell, Isis, p. 760 (1847).
Crambus Cyrilli Herrich-Schæffer, Sch. Eur., Vol. IV., Plate XX., figs. 144, 145 (1849).
Eromene ocellea Zell., Chil. et Cram., p. 54 (1863).
Eromene Californicalis Pack., Ann. Lyc. N. H. of N. Y., Vol. X., p. 264 (1873).
Eromene texana Robs., Ann. Lyc. N. H. of N. Y., Vol. IX., p. 154, Plate I., fig. 5 (1875).
Eromene ocellea Leach, Br. Pyralids, p. 87, Plate X., fig. 2 (1886).
Euchromius ocelleus Meyrick, Br. Lep, p. 396 (1895).

Expanse of wings, 19–24 mm. Head, palpi, thorax and fore wings light brownish ochreous, the latter thickly sprinkled with dark brown; an ochre-yellow, more or less oblique band a little beyond the middle, with a narrow metallic band dividing it, and a somewhat similar oblique apical band. The terminal line consists of a row of golden metallic spots, confluent on the apical third, and preceded by a row of eight or nine black points arranged in pairs, except the second above the anal angle, which has three. These black points are on the outer border of a clear field, which is limited within by two fine gray lines, which terminate

above in the oblique apical band. Fringe concolorous with the wing. Hind wings white, more or less tinged with gray.

Habitat. — Texas, Arizona, California, southern Europe, south-western Asia, Africa, Australia, Sandwich Islands. This insect is undoubtedly a native of southern Europe, and has probably been brought to this country in comparatively recent times. The early stages and food plants are unknown. At one time I supposed that the Texas and California examples should be regarded as well-marked varieties, but upon the examination of more material I find all the usual variations among the Texan specimens and also among those from California.

ARGYRIA Hüb.

Head medium; face slightly produced; eyes large, hemispherical; ocelli present; antennæ about two-thirds as long as the costa, ciliated in the male, simple in the female; labial palpi porrect, about twice the length of the head; maxillary palpi about half as long as the labial palpi; tongue well developed, scaly at the base; thorax and abdomen smooth, the latter with an extensible anal tuft in the male; legs rather stout, outer spurs half as long as the inner ones. Fore wings about twice as long as wide, with twelve veins; 8 and 9 from one stalk, all the rest separate. Hind wings two-thirds as wide as they are long, with eight veins; 4 and 5 from one stalk; cell open.

This genus was established by Hübner, in his "Verzeichniss bekannter Schmetterlinge," p. 372, placing *nummulalis* (argentana) Hüb. and *pusillalis* Hüb. under it, and therefore *nummulalis* may be considered the type.

Synopsis of the Species.

1. Fore wings with an oblique yellow band across the middle, *auratella.*
 Fore wings without a yellow band, ... 2.
2. Fore wings with yellow hind border, . . . *argentana.*
 Fore wings without yellow hind border, ... 3.
3. Fore wings with oblique costal marks, ... *lacteëlla.*
 Fore wings without oblique costal marks, . . . *nivalis.*

Argyria nivalis. (Plate V., fig. 1.)

Phalæna Pyralis nivalis Drury, Vol. III., Nat. Hist., p. 25, Plate XIV., fig. 4 (1773).
Hydrocampa (?) *nivalis* Westwood's Drury (1837).
Geometra argentata Emm., Nat. Hist. N. Y. Ag., Vol. V, Plate XL. (1854).
Urola michrochysella Walk., Lep. Het., Vol XXVII., p. 181 (1863).
Catharylla nummulalis Zell, Chil. et Cram., p. 51 (1863).
Argyria argentata Grote, Bull. Buf. Soc., Vol. II, p. 166 (1874).
Argyria nivalis Fern., N. A. Ent., p. 100 (1880).

Expanse of wings, 18–22 mm. Head, palpi, thorax and fore wings white, with a satin lustre. The outside of the palpi, the antennæ, a stripe behind the eyes, the basal edge of the costa, the terminal line and a dot near the middle of the hind margin, dark reddish brown. Fringe and anal tuft yellowish brown. Hind wings and abdomen pure white, with a silky lustre.

Habitat. — Ontario, Maine, New Hampshire, Massachusetts, New York, New Jersey, Pennsylvania, District of Columbia, Florida, Texas, Missouri, Ohio, Illinois. Food plant and early stages unknown. This comparatively common species is found in grass-lands, flying about in company with, and much like, some of the species of *Crambus*, and it is very probable that it feeds on grass.

Argyria argentana. (Plate V., fig. 2.)

Tortrix argentana Martyn, Psyche, Plate XXXII., fig. 95 (1797).
Argyria nummulalis Hüb., Zutr., figs. 185, 186 (1818).
Urola subœnescens Walk, Lep. Het., Vol. XXVII., p. 182 (1863).
Catharylla fuscipes Zell., Chil. et Cram., p. 51 (1863).
Argyria nummulalis Fern., N. A. Ent., p. 100 (1880).

Expanse of wings, 19–23 mm. Head, palpi, antennæ and a stripe backwards from the top of the head bright rust red; sides of the thorax and the fore wings white, with a satin lustre; the hind border orange yellow; basal edge of the costa and terminal line dark reddish brown; fringes much lighter than the terminal line; abdomen and hind wings very pale fuscous, with a silky lustre.

Habitat. — Pennsylvania, Illinois, Georgia, Florida. Food plant and early stages unknown.

Argyria auratella. (Plate V., fig. 3.)

Crambus auratellus Clem., Proc. Acad. N. Sc. Phil., p. 204 (1860).
Urola pulchella Walk., Lep. Het., Vol. XXVII., p. 183 (1863).
Catharylla pulchella Zell., Beitr., p. 95, Plate III., fig. 18 (1872).

Expanse of wings, 13–20 mm. Upper side of palpi, face and top of head, tegulæ and fore wings white, with the lustre of satin; sides of the palpi, antennæ, collar and middle of thorax above, and a band from the apical third of the costa to the middle of the hind margin, bright orange yellow. Terminal line dark red; fringe light orange yellow. Hind wings and abdomen white.

Habitat. — Maine, New Hampshire, Massachusetts, North Carolina, Florida, Illinois, California. Food plant and early stages unknown.

Argyria lacteëlla. (Plate V., figs. 4, 5 and 6.)

Tinea lacteëlla Fab., Ent. Syst., Vol. III., part II., p. 313 (1794).
Pyralis albana Fab., Ent. Syst., Sup., p. 476 (1798).
Argyria pusillalis Hüb., Zutr., figs. 167, 168 (1818).
Catharylla lusella Zell., Chil. et Cram., p. 51 (1863).
Catharylla rufisignella Zell., Beitr., p. 96 (1872).
Argyria pontiella Zell., Exotic Micr., p. 59 (1877).

Expanse of wings, 12–16 mm. Top of palpi, face, thorax and fore wings pure white, with a satin lustre; sides of palpi, top of head, collar, a dot on the middle of the costa, one on the middle of the hind margin and a more or less complete line connecting them, a preapical costal triangle divided by an oblique of the ground color and the terminal line, all dark rust red. Fringe rust yellow. Hind wings white, with a silken lustre. In one variety (Plate V., fig. 5) the median stripe of the fore wing is so far obliterated as to have only the costal, marginal and cellular spots, and in the typical *rufisignella* the cellular spot is also obliterated (Plate V., fig. 4). Fig. 6 represents a typical *pusillalis*, of which *lusella* and *pontiella* are synonyms. I have before me a long series passing by insensible grades from *rufisignella* into *lacteëlla*.

Habitat. — Florida, Texas, Jamaica, South America. Food plant and early stages unknown. All the types are still in existence, except that of *pusillalis* Hüb., but of this we have a recognizable figure. The type *lacteëlla* is in the Fabrician collection in Copenhagen, and the Zeller types are in the British Museum.

DIATRÆA Guilding.

Face with a conical projection; eyes large, sub-hemispherical; ocelli absent; antennæ about two-thirds as long as the costa, ciliate in both sexes, more strongly in the male; labial palpi porrect, about three times as long as the head; tongue rudimentary; thorax smooth; abdomen in the male with a moderate anal tuft; legs stout, of medium length, outer spurs about two-thirds as long as the inner. Fore wings, about two and one-half times as long as wide in the male, a little longer in the female, with twelve veins, 8 and 9 from a stalk, 11 and 12 coalesce for a short distance in some of the species; cell closed. Hind wings one and one-half times longer than wide, with eight veins, 4 and 5 from one point or stalked; cell closed.

Synopsis of the Species.

1. { Fore wings bluish gray, without marks or dots, . . *idalis.*
 { Fore wings yellow or brown, ... 2.
2. { Fore wings seal brown or yellowish brown, . male *differentialis.*
 { Fore wings pale ochre-yellow, ... 3.
3. { Fore wings with a terminal dark line, ... *alleni.*
 { Fore wings with terminal dots, ... 4.
4. { Expanse more than one inch and a half, female *differentialis.*
 { Expanse less than one inch and a half, . . . *saccharalis.*

Diatræa saccharalis. (Plate V., fig. 8.)

Phalæna saccharalis Fab., Ent. Syst., Vol. III., part 2, p. 238 (1894).
Phalæna saccharalis Fab., Skrifter af naturalist. Selak., Vol. III., part 2, p. 63, Plate VIII, fig. 1 (1894).
Diatræa sacchari Guilding, Trans. Soc. Ency. Arts, Vol. XLVI., p. 143 (1832).
Chilo obliteratellus Zell., Chil. et Cram., p. 8 (1863).
Chilo obliteratellus Zell., Ent. Zeit., Vol. XXXIII., p. 465 (1872).
Chilo obliteratellus Feld. & Rghf., Novara., Plate CXXXVII., fig. 24 (1874).
Chilo obliteratellus Zell., Exot. Microp., p. 12 (1877).
Chilo crambidoides Grote, Can Ent., Vol. XII., p. 15 (1880).
Diatræa obliteratella Zell., Col. Chil. Cram. & Phy., p. 10, Plate XI., fig. 5 (1881).
Diatræa obliteratella Com., Report Dep. Ag., p. 240 (1881).
Diatræa obliteratella Mœsch., Lep. Fauna von Port, p. 322 (1890).
Diatræa striatalis Snell., Tijds. v. Ent., Vol. XXXIV., p. 349, Plate II., figs. 1–4 (1891).

Expanse of wings, 28–38 mm. Head, palpi, antennæ, thorax and fore wings pale ochre-yellow, the latter with darker venular and intervenular lines; one discal and seven terminal dots black. Hind wings white in the females, pale yellow in the males. All the fringes are concolorous with the adjacent part of the wings. There is a curved line of more or less distinct brown dots from within the apex across the wing, curving in towards the base of the hind margin, and also a trace of a second parallel line between this and the end of the cell. These lines of dots occur more or less distinctly in the males and also in a few females.

Habitat. — South Carolina, Georgia, Louisiana, Kansas, West Indies, South America. Food plants, corn and sugar-cane.

Egg. — The eggs are flat and circular, 1 mm. in diameter, white when first deposited, but turn yellow before hatching. They are laid early in the spring, upon the leaves of the young cane, near the axils, and, hatching in a few days, the larvæ bore their way into the stems in the immediate vicinity, and work upwards through the soft pith. The larvæ grow very rapidly, and leave their burrows occasionally to

crawl about on the outside of the stalk, and bore in again in a new place. The full-grown larva is about an inch long, rather slender, nearly cylindrical, cream white in color, and has a yellow head. When full grown it bores a hole to the surface, then retires a short distance and transforms into a slender brown pupa, about three-fourths of an inch long. In a few days the moth emerges and lays eggs for another brood, of which there are several in a season. They are supposed to hibernate in the larval stage.

The above account is compiled from the Report of the Department of Agriculture for 1880, p. 240, where remedies are given for this insect.

Diatræa alleni. (Plate V., fig. 9.)

Diatræa alleni Fern., Ent. Am., Vol. IV., p. 120 (1888).

Expanse of wings, 30 mm. Head, palpi above and middle part of the collar cream white. Outer side of the labial palpi, sides of the head and thorax and the fore wings cream buff. The hind border of the fore wings as far as vein 1, and a few longitudinal streaks beyond the brown discal spot, paler, and the whole surface of the wing evenly and sparsely sprinkled with minute brown scales; terminal line brown, fine, somewhat broken, not reaching the anal angle. Fringes whitish at the base, but darker beyond. Hind wings sordid cream color, but lighter on the basal part. Fringes lighter than the adjacent parts of the wings. Under side of the fore wings pale fuscous, with the brown terminal line reproduced.

Habitat. — Orono, Maine. Early stages and food plant unknown.

DIATRÆA DIFFERENTIALIS. (Plate VI., figs. 7 and 8.)

Diatræa differentialis Fern., Ent. Am., Vol. IV., p. 120 (1888).

Expanse of wings, 43 mm. in the males, 54–61 mm. in the females. Head, palpi, antennæ, thorax and fore wings seal brown. The top of the head and palpi, and the posterior edge of the fore wings as far as vein 1, somewhat lighter, and the fore wings sprinkled with dark scales; a small dark-brown discal spot at the end of the cell; a terminal row of seven spots of the same color, the one at the anal angle being double. Hind wings pale fuscous, lighter towards the base, which is of the same color as the abdomen. Under side of the hind wings like the upper side in color, and the under side of the fore wings a little darker; legs pale seal brown, darker in front. The female has the head, palpi, thorax and fore wings of a light brownish color, the latter sprinkled with brownish atoms. The discal and terminal spots are similar to those in the male. The remaining parts of the insect are similar to those in the male, except that the shades incline to yellowish. The difference of color between the two sexes, as shown above, is most remarkable.

Habitat. — Florida. Early stages and food plant unknown.

DIATRÆA IDALIS n. sp. (Plate VI., fig. 12.)

Expanse of wings, 25–34 mm. Head, palpi, thorax and fore wings pale mouse color, with a faint indication of an oblique row of brown dots across the end of the cell in one specimen. Hind wings pure white. Described from one female in my collection. I have a male from the National Museum, in very poor condition, which is somewhat darker, and indicates that the markings on the fore wings are more prominent. The hind wings are pale gray.

Habitat. — New Jersey, Georgia. I take pleasure in naming this interesting insect for Miss Ida J. Russell, who has rendered me most valuable assistance in my entomological work.

CHILO ZINCKEN.

Face with a conical projection; eyes large, sub-hemispherical; ocelli present; antennæ about two-thirds as long as the costa, ciliate in the male; labial palpi porrect, nearly three times as long as the head; maxillary palpi about as long as the head, triangular, and resting on the labial palpi; tongue short; thorax smooth; abdomen in the male with a small anal tuft; legs stout, of medium length, outer spurs about two-thirds as long as the inner. Fore wings with twelve veins, 8 and 9 from one stalk, all the others separate; cell closed. Hind wings with eight veins, 4 and 5 from one point or stalked; cell closed.

SYNOPSIS OF THE SPECIES.

1.	Fore wings with metallic fringes and sprinkles, .	*plejadellus.*
	Fore wings without metallic scales, ...	2.
2.	Fore wings with veins interlined with dark, . . .	*densellus.*
	Fore wings with the veins not interlined, ...	3.
3.	Fore wings with the ground color white, . .	*squamulellus.*
	Fore wings with ground color brown, ...	4.
4.	Hind wings dark fuscous, ...	*comptulatalis.*
	Hind wings white, fuscous apically, . . .	*forbesellus.*

CHILO PLEJADELLUS. (Plate V., figs. 10, male, and 11, female.)

Chilo plejadellus Zinck., Germ. Mag., Vol. IV., p. 251 (1821).
Jartheza sabulifera Walk., Lep. Het., Vol. XXVII., p. 185 (1863).
Crambus plejadellus Zell., Chil. et Cram., p. 26 (1863).
Diphryx prolatella Grote, Bull. U. S. Geo. Sur., Vol. VI., p. 273 (1881).
Chilo oryzaeëllus Riley, Rep. Dep. Ag., p. 135, Plate VII., fig. 1 (1882).

Expanse of wings, 22–32 mm. Head, thorax and fore wings pale ochreous; labial palpi quite bushy, clothed with numerous black scales and hairs intermixed. Fore wings with numerous ferruginous scales scattered between the veins, across the end and below the cell; a series of golden metallic scales forms a subterminal line rounded and curved away from the apex; a terminal row of seven black dots. Fringes golden metallic, with metallic scales scattered over the wing. Hind wings rather paler. Female (fig. 3, *d*) much lighter in color than the male, hind wings and abdomen pure white, palpi less bushy, and with less brown scattered over the fore wings.

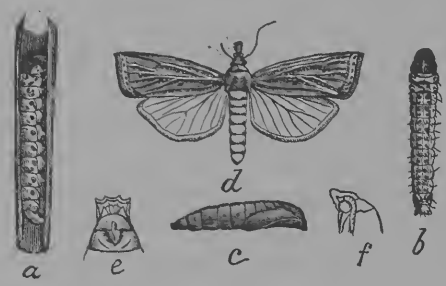


FIG. 3.— *Chilo plejadellus: a*, larva, side view in split stem; *b*, larva, back view; *c*, pupa; *d*, female moth, natural size; *e*, tip of pupa from beneath; *f*, head of the same, side view — enlarged. — From Department of Agriculture.

"*Larva.* — Average length, 23 mm. Head dark brown, and furnished with a few scattered brownish hairs (fig. 3, *a* and *b*). Thoracic shield light brown, median line still paler, front margin whitish; a blackish triangular spot, widening towards the lateral margin, on each side of the dorsal line. Color of the body pale yellowish white, slightly transparent, marked with four rather indistinct, pale-purplish stripes, of which those bordering the stigmata are scarcely half as broad as the others. Tubercles large, oval, pale yellowish

and polished; stigmata small, transversely oval, brown, the last pair twice as large as the others. Anal shield yellow, polished, furnished with a row of hairs upon each side and two near the middle; it is marked with a few brownish spots. Legs yellow.

"*Pupa.* — Length, 17 mm. Color, yellowish brown; head, thorax, wing-sheaths and stigmata somewhat darker; eyes black. Head bent forward, its front somewhat pointed. Thorax with very fine transverse striæ. Abdominal segments 5–7 armed dorsally near their anterior margin with numerous very minute brownish spines; all segments with extremely fine granulations. Tip of last segment rounded, with a longitudinal lateral impression; expanded dorsally into two flattened projections, each being divided into broad teeth (fig. 3, *c*, *e* and *f*)." (Riley.)

Habitat. — Pennsylvania, Georgia, Louisiana, Wisconsin. Food plants: this insect is a borer in the stems of rice, and probably of other plants.

Chilo densellus. (Plate V., fig. 7.)

Chilo densellus Zell., Col. Chil., p. 5, Plate XI., fig. 2 (1881).
Spermatophthora multilineatella Hulst, Ent. Am., Vol. III., p. 184 (1887).

Expanse of wings, 18–21 mm. Head, palpi, thorax and fore wings pale ochreous, with venular and intervenular dark ochreous lines. Discal and seven terminal dots black. Hind wings pale yellow. Females paler, with more pointed fore wings and white hind wings. All the fringes concolorous with the wings.

Habitat. — Florida, Texas, Illinois. Food plants and early stages unknown.

Chilo squamulellus. (Plate V., fig. 12.)

Chilo squamulellus Zell., Col. Chil., p. 5, Plate XI., fig. 3 (1881).

Expanse of wings, 18–21 mm. Head, palpi, thorax and fore wings white, sprinkled with brown atoms. The inner cross-line pale straw yellow, and, starting from the basal

third of the costa, extends in a straight line to the end of the cell, where it forms an acute angle and runs to the middle of the hind margin, giving off one tooth in the middle of its course. The outer line white, bordered on each side with a fine, pale, straw-yellow line, and, starting from the outer fourth of the costa, curves around to the fold, where it forms an obtuse inward angle, then runs to the hind margin. Fringe trisected by two fine black lines through it. Hind wings pure white.

Habitat. — Texas. Food plant and early stages unknown.

Chilo comptulatalis. (Plate VI., fig. 9.)

Crambus comptulatalis Hulst, Tr. Am. Ent. Soc., Vol. XIII., p. 167 (1886).

Expanse of wings, 26 mm. Head, palpi, thorax and fore wings dark umber brown, the latter with numerous black scales along the basal half of the submedian fold, broken by a light spot. Black-and-white scales scattered in the outer part of the cell, and a black discal dot surrounded by white scales. The arcuate outer cross-line half way between the cell and end of the wing, and from which indistinct dark lines extend to the terminal dark-brown dots. Hind wings and abdomen dark fuscous throughout.

Habitat. — Illinois, Missouri, Colorado, Nebraska, Vancouver Island. Food plant and early stages unknown.

Chilo forbesellus n. sp. (Plate VI., figs. 10 and 11.)

Expanse of wings, 23–38 mm. Head, palpi, thorax and fore wings dark umber brown, varying in depth of shade according to the freshness of the specimen. Fore wings with more or less white scales on the outer part of the cell, the cellular black dot in the midst of them; a similar series of white scales scattered along the submedian fold, with a black dash near the middle of the wing in the fold and another a little before it. The outer cross-line and terminal row of black dots are visible only in more or less worn specimens. Hind wings white, pale fuscous apically, with a dark-brown broken terminal line not reaching the anal

angle. First two segments of the abdomen white, remaining segments pale yellow. Female larger and lighter in color than the male, discal and terminal dots more plainly visible and hind wings lighter.

Habitat. — New York, Illinois.

There are a male and a female of this species in the National Museum, labelled "From Scirpus, D. C. Kellicot, Buffalo, N. Y." It is probable that this insect is a stem borer in Scirpus.

Named in honor of Prof. S. A. Forbes, from whom it was received, in recognition of his valuable contributions to economic entomology.

Explanation of Plate A.

Anatomy of Crambus laqueatellus.

The original drawings for Plates A, B and C were made by Mr. R. A. Cooley, under my direction and supervision.

a, antenna; *c*, clypeus; *e*, eye; *l*, labrum; *m*, mandibles; *o*, ocelli; *s*, scapula; *sa*, spiny area; *mp*, maxillary palpi; *lp*, labial palpi; *pl*, prothoracic lobes; s^2, mesoscutum; s^3, metascutum; sm^2, mesoscutellum; sm^3, metascutellum; c^1, c^2, c^3, coxæ of the fore, middle and hind legs; *sp*, spine.

Fig. 1. Side view of denuded body.

Fig. 2. Dorsal view of denuded body.

Fig. 3. Front view of head.

Fig. 4. Ventral view of head.

Fig. 5. Fore leg.

Fig. 6. Tibial epiphysis.

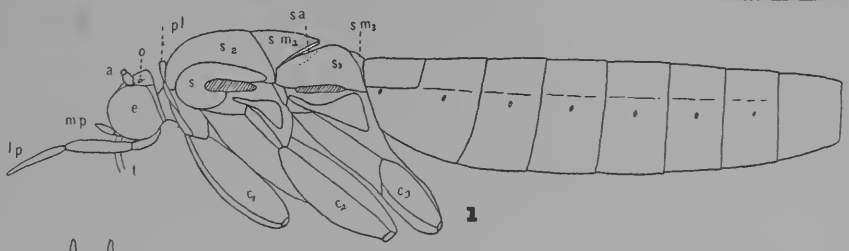
Fig. 7. Middle leg.

Fig. 8. Hind leg, showing the tip of one of the tibial spurs enlarged at the left.

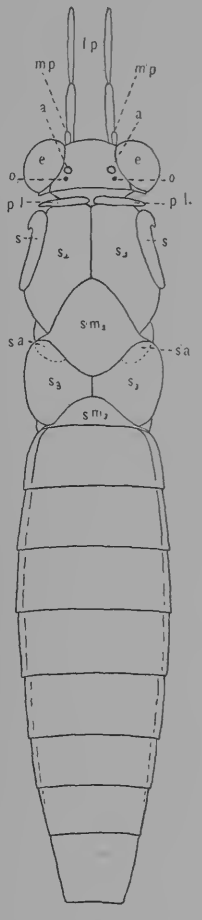
Fig. 9. Two joints from the middle of the female antenna.

Fig. 10. Portion of a joint from male antenna, enlarged, showing sense pits, spines and reticulated surface.

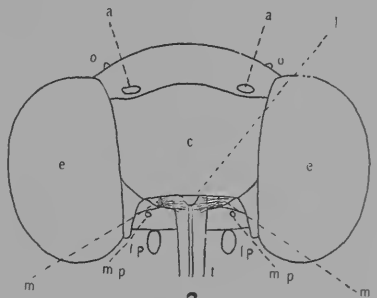
Fig. 11. Portion of hind wing, showing the end of a vein, a spine (*sp*) and scale pits.



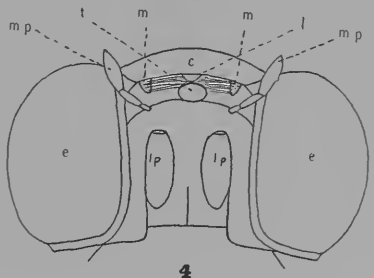
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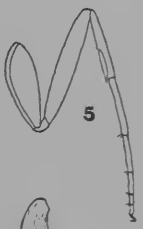
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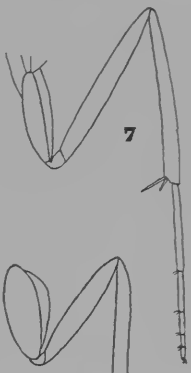
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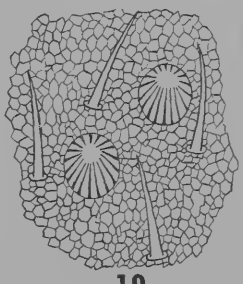
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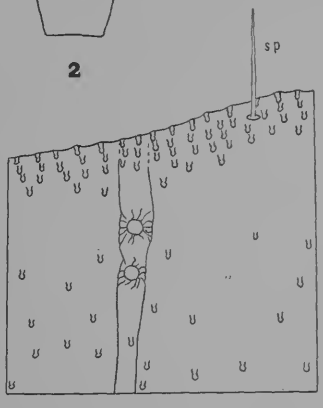
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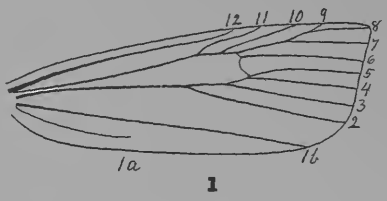
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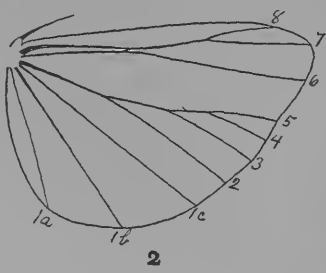
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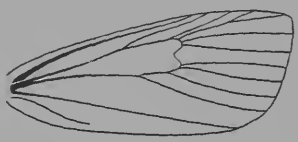
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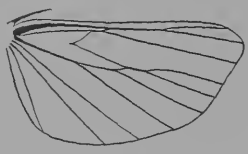
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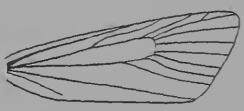
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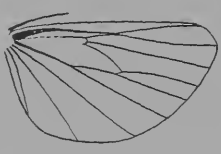
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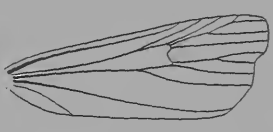
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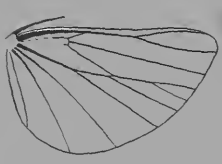
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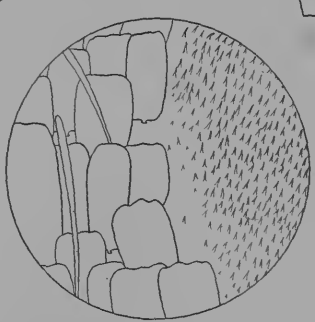
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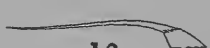
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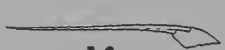
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Explanation of Plate B.

Fig. 1. Fore wing of *Crambus laqueatellus*.

Fig. 2. Hind wing of *Crambus laqueatellus*.

Fig. 3. Fore wing of *Chilo plejadellus*.

Fig. 4. Hind wing of *Chilo plejadellus*.

Fig. 5. Fore wing of *Euchromius californicalis*.

Fig. 6. Hind wing of *Euchromius californicalis*.

Fig. 7. Fore wing of *Prionapteryx achatina*.

Fig. 8. Hind wing of *Prionapteryx achatina*.

Fig. 9. Fore wing of *Eugrotea dentella*.

Fig. 10. Hind wing of *Eugrotea dentella*.

Fig. 11. Fore wing of *Crambus laqueatellus*, showing the spiny area at the base and the loop of modified scales through which the frenulum passes.

Fig. 12. View from the edge of the spiny area from the fore wing of *Crambus laqueatellus*.

Fig. 13. Male frenulum of *Crambus laqueatellus*.

Fig. 14. Female frenulum of *Crambus laqueatellus*.

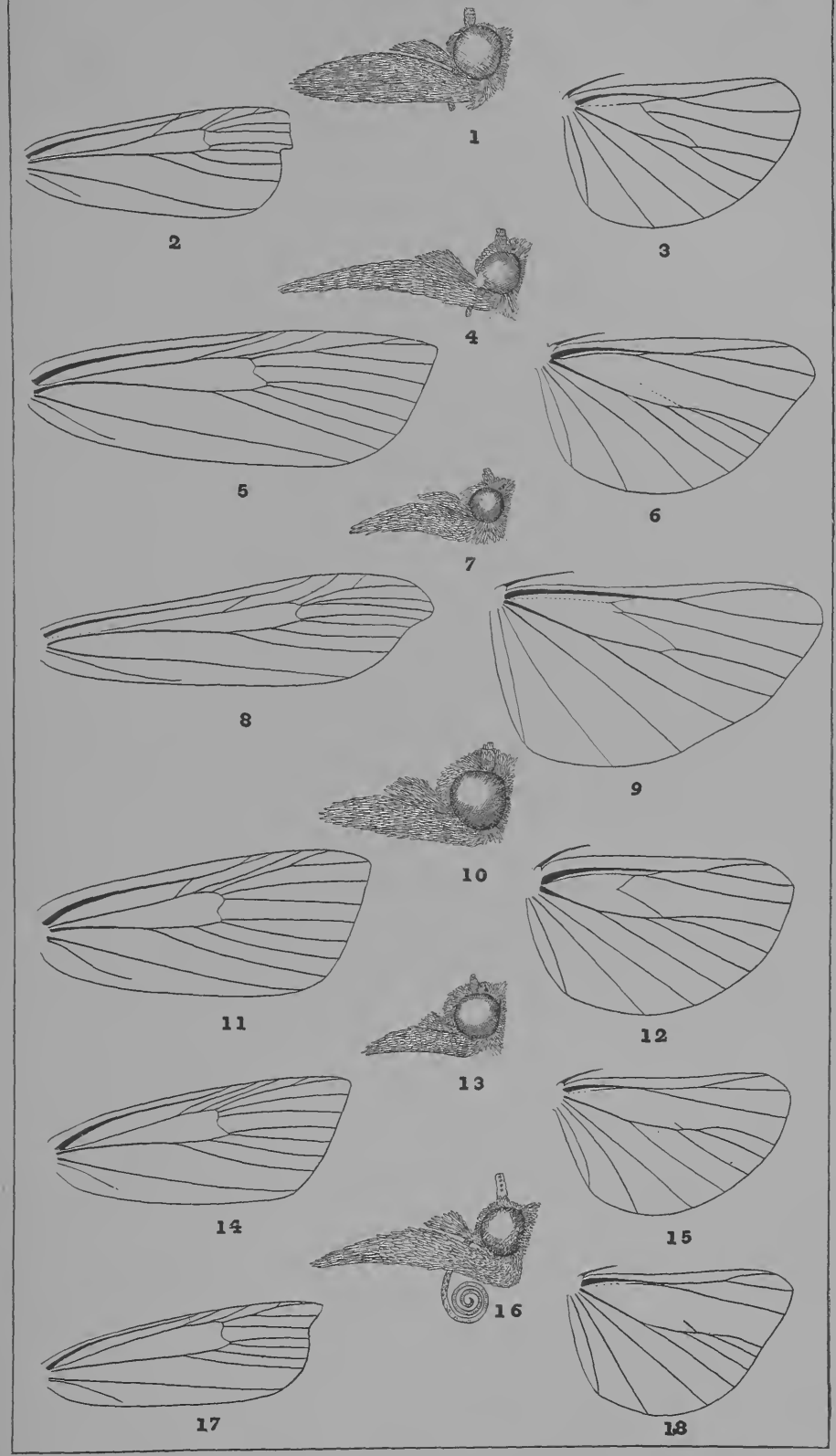
Fig. 15. Male antenna of *Prionapteryx nebulifera*.

Fig. 16. Male antenna of *Pseudoschœnobius opalescalis*.

Fig. 17. Male antenna of *Crambus laqueatellus*.

Explanation of Plate C.

Fig. 1. Side view of head of **Prionapteryx nebulifera.**
Fig. 2. Fore wing of **Prionapteryx nebulifera.**
Fig. 3. Hind wing of **Prionapteryx nebulifera.**
Fig. 4. Side view of head of **Thaumatopsis pexellus.**
Fig. 5. Fore wing of **Thaumatopsis pexellus.**
Fig. 6. Hind wing of **Thaumatopsis pexellus.**
Fig. 7. Side view of head of **Pseudoschœnobius opalescalis.**
Fig. 8. Fore wing of **Pseudoschœnobius opalescalis.**
Fig. 9. Hind wing of **Pseudoschœnobius opalescalis.**
Fig. 10. Side view of head of **Diatræa saccharalis.**
Fig. 11. Fore wing of **Diatræa saccharalis.**
Fig. 12. Hind wing of **Diatræa saccharalis.**
Fig. 13. Side view of head of **Argyria nummulalis.**
Fig. 14. Fore wing of **Argyria nummulalis.**
Fig. 15. Hind wing of **Argyria nummulalis.**
Fig. 16. Side view of head of **Crambus pascuellus.**
Fig. 17. Fore wing of **Crambus pascuellus.**
Fig. 18. Hind wing of **Crambus pascuellus.**


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The original drawings for plates I-VI were made by Miss ELLA M. PALMER.

Explanation of Plate I.

1. Crambus satrapellus.
2. Crambus leachellus.
3. Crambus pascuellus.
4. Crambus hastiferellus.
5. Crambus carpenterellus.
6. Crambus unistriatellus.
7. Crambus præfectellus.
8. Crambus bidens.
9. Crambus alboclavellus.
10. Crambus agitatellus.
11. Crambus laqueatellus.
12. Crambus multilineëllus.
13. Crambus girardellus.
14. Crambus gausapalis.
15. Crambus decorellus.

Explanation of Plate II.

1. Crambus argillaceëllus.
2. Crambus minimellus.
3. Crambus occidentalis.
4. Crambus hamellus.
5. Crambus albilineëllus.
6. Crambus trichostomus.
7. Crambus myellus.
8. Crambus luctiferellus luctuellus.
9. Crambus mutabilis.
10. Crambus anceps.
11. Crambus hortuellus.
12. Crambus dissectus.
13. Crambus hemiochrellus.
14. Crambus ruricolellus.
15. Crambus bolterellus.



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Explanation of Plate III.

1. Crambus cypridalis.
2. Crambus dumetellus.
3. Crambus hulstellus.
4. Crambus attenuatus.
5. Crambus albellus.
6. Crambus pusionellus.
7. Crambus labradoriensis.
8. Crambus coloradellus. Fore wing enlarged.
9. Crambus oregonicus.
10. Crambus teterrellus.
11. Crambus trisectus.
12. Crambus undatus.
13. Crambus turbatellus.
14. Crambus perlellus.
15. Crambus inornatellus.

Explanation of Plate IV.

1. Crambus biothanatalis.
2. Crambus caliginosellus.
3. Crambus caliginosellus.
4. Crambus zeëllus.
5. Crambus luteolellus.
6. Crambus luteolellus ulæ.
7. Crambus laciniellus.
8. Crambus elegans.
9. Thaumatopsis pectinifer.
10. Thaumatopsis striatellus.
11. Thaumatopsis magnificus.
12. Thaumatopsis edonis.
13. Crambus dimidiatellus.
14. Thaumatopsis pexellus.
15. Thaumatopsis repandus.



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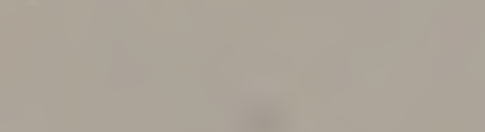
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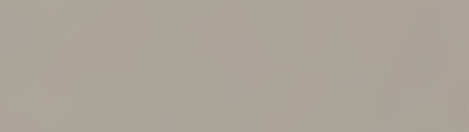
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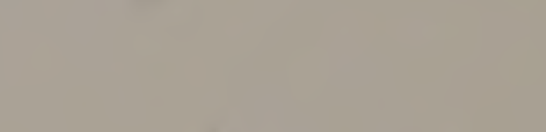
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Explanation of Plate V.

1. Argyria nivalis.
2. Argyria argentana.
3. Argyria auratella.
4. Argyria lacteëlla.
5. Argyria lacteëlla.
6. Argyria lacteëlla.
7. Chilo densellus.
8. Diatræa saccharalis.
9. Diatræa alleni.
10. Chilo plejadellus, male.
11. Chilo plejadellus, female.
12. Chilo squamulellus.
13. Euchromius ocelleus.
14. Euchromius ocelleus.
15. Crambus vulgivagellus.

Explanation of Plate VI.

1. Prionapteryx nebulifera.
2. Prionapteryx achatina.
3. Prionapteryx achatina.
4. Prionapteryx cuneolalis.
5. Eugrotea dentella.
6. Crambus bonifatellus.
7. Diatræa differentialis, male.
8. Diatræa differentialis, female.
9. Chilo comptulatalis.
10. Chilo forbesellus, male.
11. Chilo forbesellus, female.
12. Diatræa idalis.
13. Pseudoschœnobius opalescalis.
14. Uinta oreadella.



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